The Sight-Saving Review

Volume VIII Number 2

June, 1938

Table of Contents

PAGE

REPORT OF THE COMMITTEE ON CONSERVATION OF VISION OF THE STATE AND PROVINCIAL HEALTH AUTHORITIES OF NORTH AMERICA, A. C. Jost, M.D. 83

SCIENCE SAVES EYESIGHT, Donald G. Cooley 89

1937 SURVEY OF FIREWORKS ACCIDENTS IN MARYLAND 100

NEW TRENDS IN SIGHT-SAVING CLASS ACTIVITIES, Winifred Hathaway 106

ETERNAL VIGILANCE—THE PRICE OF GOOD EYES, E. Clifford Place, M.D. 116

VISIBILITY AND READABILITY OF PRINT ON WHITE AND TINTED PAPERS, Matthew Luckiesh, D.Sc., and Frank K. Moss 123

EDITORIALS:

The Campaign for a "Sane Fourth" 135

The Institute on Eye Health 137

THE FORUM:

The Doctor and Sight Conservation, Park Lewis, M.D. . 138

NOTE AND COMMENT:

Dana Medal Awarded to Dr. Ellice M. Alger 143

The Value of Tinted Lenses 144

"Streamlining" Headlines Increases Legibility 144

British Survey of Causes of Blindness 144

Facilities of Health Library in Great Demand 145

Polarized Light Banishes Glare 145

Cross-Eyed American Beauty 145

Maryland Society Surveys Work for 1937 146

Transplanting Corneas to Restore Vision 146

PAGE

Heavy Blows Fail to Smash Goggles 146
Electric Shock May Cause Cataract 146
Hand and Eye Co-ordination 147
Student Awarded $15,000 for Eye Injury 147
Lighting Requirements for Healthful Housing 147
Madame Curie Victim of Cataract 147
Bespectacled Cameras 148
Fewer Blind Children in London 148
College Men Deficient in Vision 148
New Research Center for Prevention of Blindness 148
New International Sight Conservation Publication 148
National Society Notes 149

CURRENT ARTICLES OF INTEREST 151

BOOK REVIEW, by Conrad Berens, M.D. 155
Briefer Comment 156

CURRENT PUBLICATIONS ON SIGHT CONSERVATION 158

CONTRIBUTORS TO THIS ISSUE 160

Report of the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America*

A. C. Jost, M.D.

THROUGH a study of the work of state and provincial public health departments in the conservation of vision, it is hoped that a clearer understanding may be attained of the functioning of these agencies in the prevention and control of diseases which may be detrimental to vision

THE following is a brief résumé of developments in conservation of vision activities as they relate to health departments, gathered from the membership of the conference committee appointed for consideration of this phase of health. Further detailed information is in the hands of the committee chairman and can be made available through the National Society for the Prevention of Blindness.

Ophthalmia Neonatorum

In 1906, the first general tabulation of causes of blindness among new admissions to schools for the blind was taken. From then until the year 1933, the percentage of blindness due to ophthalmia neonatorum dropped from 28.2 to 6.7. Since 1933 an upward trend has been noted, and figures for the school year 1935–36 show that 9.1 per cent of the new pupils were admitted because of ophthalmia neonatorum—this in spite of the fact that present laws or health department regulations in all but three of our states require the use of a prophylactic in the eyes of the newborn. It is true that in some states these rulings are so qualified

* Presented at the Conference of the State and Provincial Health Authorities of North America, in Washington, D. C., April 11, 1938.

that they do not cover all cases, and a further fact to be noted is the variance in other provisions, such as furnishing of prophylactic by the health department, securing of medical care, and investigation of cases. In one state ophthalmia neonatorum is not reportable either to state or to local health officers.

Though the rise in percentage as mentioned may, with recent improved regulatory measures, prove only temporary, it still calls attention emphatically to the need for further control measures and to the importance of their enforcement. A periodic check-up on all facts relating to the occurrence of ophthalmia neonatorum would make it possible to determine weak points in procedure and lead to the strengthening of our state programs in this field.

Venereal Diseases and Congenital Syphilis

Present emphasis on venereal disease control and expanding provisions in health departments leading to the examination and treatment of all infected persons are significant from the standpoint of eye health. Though the actual amount of loss of vision due to syphilis is unknown, in some groups studied the proportion blinded from this disease is as high as 15 per cent, and, according to figures of the American Social Hygiene Association, a majority of those born with syphilis find their eyes affected before the age of 30. In view of these facts, the action taken by several health departments encouraging routine blood tests for all expectant mothers is to be particularly commended, as is the promotion of measures to secure health examinations, including blood tests, for persons before marriage.

As further evidence of the part which health departments are taking in venereal disease control, mention may be made of their participation in the educational campaign centering around Social Hygiene Day, in February, and their continued use of informative material furnished by the American Social Hygiene Association and the National Society for the Prevention of Blindness.

Trachoma

It is the recommendation of the Committee that the Conference of State and Provincial Health Officers recognize the importance of the trachoma problem as it exists among Indians. It is true this is

a small indigenous group in comparison with the population as a whole, but more and more the Indians are becoming an actual part of the general population in consequence of their intimate contact with the whites.

Trachoma is not such a problem among the Eastern tribes, but is of serious importance in New Mexico and Arizona, and to some extent in the Dakotas. In the far Western states the tourist travel has developed, and some emphasis is placed on the native Indian as local color; it is in these places that trachoma is seriously prevalent—as high as 30 per cent, for example, among the Navajo tribes of Arizona.

It is recommended that the State and Provincial Health Authorities address the Commissioner of Indian Affairs, advising of their knowledge of conditions and offering any assistance which can adequately be given, in co-operation with the local medical group. Aside from moral support, active assistance may be possible through Social Security appropriations and pensions for blind Indians in co-operation with the government. It is the further recommendation of the committee that the conference recognize the fact that this Indian problem is a matter which should be of interest and concern to the state health officers in whose states the problem is acute, as well as to officials of the federal government who are working along these lines.

It is evident also that the Blind Assistance Programs are indicating that trachoma is an important problem in certain states. In view of the fact that the United States Public Health Service is no longer assuming chief responsibility for the control of trachoma, it would seem advisable for the health and welfare departments in these states to co-operate in developing an adequate plan for case finding and control.

Sight Conservation

It will be recalled that, at its meeting in April, 1937, the Conference of State and Provincial Health Authorities approved a resolution presented by its Committee on Conservation of Vision, calling for the adoption of a plan to promote sight conservation programs under the auspices of state health departments. It was proposed that one or more demonstrations be urged as a means of

showing the value of an approach to this problem through public health channels. The present chairman of this Committee was later appointed to serve with a group of representatives from other national voluntary and federal agencies to act as spokesman for the Conference and to consider possible procedures under the agency of an Interorganization Committee on Sight Conservation.

While recognizing the extent to which measures for prevention of blindness and sight conservation are included in the regular administrative plans of our health departments, it was felt that the focusing of these activities with expansion along certain lines of medical, social and educational service would be advantageous. Since health departments seem a logical channel for such centering of activities, thought was given to the development of an outline suggesting ways in which sight conservation could be developed under health department auspices, which would at the same time utilize and stimulate appropriate activities of other state agencies, thus leading to an inclusive and fully integrated state program.

In September, 1937, the Interorganization Committee sent letters to the executive health officers of 48 states, the District of Columbia, Alaska, and Hawaii, asking for their opinion in regard to this proposition and their suggestions as to practical methods of procedure. The matter was also presented to a representative group of health officials at a dinner given, during the American Public Health Association Conference, by the National Society for the Prevention of Blindness. Replies have been received from 16 states, the District of Columbia, Alaska, and Hawaii. The health officers from 10 states, 1 territory, and the District of Columbia express interest in the proposal and a wish to co-operate with the Interorganization Committee; 1 state and 1 territory express interest but fail to see how further activities can be made financially possible; 3 states are satisfied with present co-operative practices and see no need for a more intensive program; 1 state approves co-operation but sees the activity as principally in the social welfare field; 1 state, though recognizing sight conservation as a health responsibility, indicates that this is being fully met.

It is interesting to note that the majority of health officials who answered appreciate that successful results can be brought about only through co-ordinated efforts of the various state agencies,

though there is some difference of opinion as to where central authority may be most properly placed.

In 31 replies to letters sent simultaneously to state welfare officials, we find similar difference of opinion; practically all see the need for close co-ordination, with responsibilities shared, though 2 believe definitely that the chief obligation is on the health department. In several instances the wish is expressed that closer co-operation between health and welfare departments might be developed.

Certainly replies seem to indicate an awareness of the need for a sight conservation program such as was outlined. It is somewhat disappointing, however, that response from health officers, though in many cases indicating careful consideration and evaluation of present conditions, has not been so strong as to make the Interorganization Committee feel justified in sponsoring a demonstration as such. A two-day conference held with health, welfare, and educational department executives, in one state wanting to explore the possibilities further, has resulted in the formation of an interdepartmental committee of the three state officials concerned, and the setting down on paper of definite functions falling within the responsibility of each department. As to how far and at what time this may become an actual program, it is impossible to say.

During November and December, 1937, a member of the Interorganization Committee on Sight Conservation and the regional consultant of the United States Public Health Service took up, with the West Virginia State Department of Health, the question of a study of the trachoma situation in that state. The health department, after considering the possibilities and desirability of such a survey in some of the more isolated counties, and after consultation with various agencies interested in the subject, decided to undertake a study of eye conditions in six of the more rugged counties. It consulted Dr. Alan C. Woods, Director of the Wilmer Institute of Johns Hopkins University, about securing the services of a young ophthalmologist, and received much encouragement concerning this plan.

Dr. Robert A. Hare, of the Wilmer Institute, has been loaned to the West Virginia State Department of Health for three months to make such a survey in six counties. He will be assisted by two

public health nurses and one clerk. The Wilmer Institute has a very commendable interest in this survey. Many deplorable eye conditions in people from West Virginia are treated at the Institute. It is the hope of Dr. Woods that this survey may be instrumental in stimulating that state to do something about its eye problems.

The Interorganization Committee has not wished to lay down a set pattern for adoption or rejection by the states. It has proposed certain general procedures which it considers essential in a constructive and inclusive approach to the prevention of needless visual handicap, but it believes that each state program must be developed in relation to the particular situation and that the impetus and assumption of leadership must come from within the locality. Though perhaps at this time the Interorganization Committee must present a less tangible evidence of sight conservation developments than was anticipated a year ago when the idea of one or more state demonstrations was accepted, there is cause for gratification in an awakening interest among state and local personnel and in a broadening concept of the problem of eye health. With further study and evaluation of conditions and possibilities in the states, it is to be hoped that health departments will take a forward step and assume their full share in meeting this very real need.

The Committee on Conservation of Vision will welcome any suggestions and opportunities for more detailed discussion.

Science Saves Eyesight*

Donald G. Cooley

SCIENCE has made great strides since the days when the "eye doctor" used to prescribe spectacles in hit or miss fashion. By means of intricate scientific instruments minute defects in the shape of the eyeball may be measured and the interior of the eye may be examined for the location of foreign bodies or the symptoms of either visual or systemic diseases

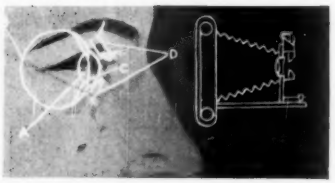
DOES it astonish you to be told that at this very moment, as you read these words, you are totally blind for a considerable part of the time it takes you to scan this sentence?

Science has proved that the human eye can see nothing while it is in motion. You read this line of type in four or five jumps, pausing at stopping-points to absorb a word or two, then passing on. As the eye moves from one fixation point to another you are quite blind, although you do not realize it because of the phenomenon of persistence of vision—the fortunate provision of nature which makes the movies possible.

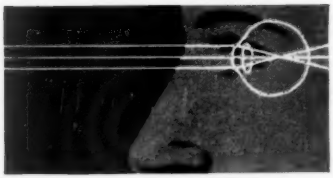
For that matter, man is the only animal with an eye capable of reading or other close work. And there is only one tiny spot in the eye, called the macula, which can see things sharply. When you look at an object which you must see distinctly, you focus its light rays upon the macula. You can demonstrate this for yourself by focusing your vision on a word in the center of this line. It is clear and sharp. But the words on either side fade out to an indistinguishable gray blur.

The eye is such a complex precision instrument that in the entire human race there is probably no such thing as a physiologically perfect eye. Most eye defects are errors of refraction—some ele-

* Reprinted, with permission, from *Modern Mechanix*, January, 1938. Photographs by courtesy of Bausch and Lomb Optical Company.

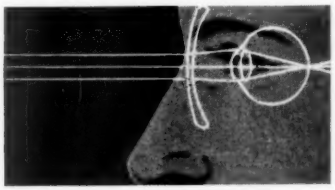


Like a camera the eye has its (a) lens; (b) film, the retina; (c) diaphragm; and (d) shutter, the eyelid. The eye focuses by changing the shape of its lens.

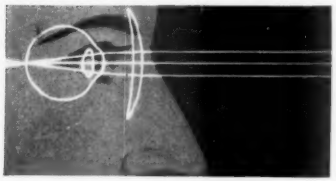


If the eyeball is too long, or if the cornea is too strongly curved, images of distant objects are brought to focus in front of the retina.

When the eyeball is too short, or the front of the eye (the cornea) is not sufficiently curved, rays of light come to a focus behind the retina.



Nearsightedness is corrected by a concave lens, which bends the light rays and brings them to a focus on the retina.



To correct farsightedness, a convex spectacle lens is worn before the farsighted eye to bring the light rays to a sharp focus on the retina.

Astigmatism, the inability of the eye to see both horizontal and vertical lines with equal sharpness at the same time, is corrected by a cylindrical or toric lens.

ment of the eye is imperfectly shaped so that the organ cannot refract, or bend, the rays of light to focus them exactly on the retina. Years ago the old-time "eye doctor" used to prescribe spectacles in hit or miss fashion by allowing his patient to try on various lenses from his sample case. When the customer found a lens which seemed to help him see better, the transaction was completed without any further tests. This "trial and error" method is part of the ancient history of the science of refraction. Today the refractionist uses delicate measuring devices which are among the most sensitive precision instruments known to any branch of science.

One such instrument, called Green's refractor, is a complete optical miracle in itself. It is a complex instrument of dials, lenses and knobs which almost completely obscures the patient's face as he peers through it. To the uninitiated it looks like a monstrous mechanical mask suggestive of a Rube Goldberg invention. But this single mechanism is capable of making every examination required in refractive procedures.

To understand this major miracle, some comprehension of the most common refractive errors of the eye is necessary. Your own eye is practically certain to be nearsighted, farsighted, or astigmatic, although very possibly to such a slight degree that no optical correction is necessary. Nearsightedness is generally the result of an eyeball which is too long: the lens focuses light rays in front of the retina instead of upon it. It is corrected by concave lenses. In farsightedness, the eyeball is too short and rays are focused behind the retina. The condition is corrected by convex lenses. Astigmatism results when the cornea—the transparent window at the very front of the eye—is curved unequally like the bulge of a teaspoon, instead of a mathematically correct spherical bulge. Compound lenses with unlike curves in different meridians compensate for this anomaly.

Sounds pretty complicated, doesn't it? Especially when you consider that two or more refractive deviations are usually found in the same eye. If you operate a camera, you know how critical a matter it is to focus your subject sharply. The slightest miscalculation gives a fuzzy negative. It's the same with the eye, except that spectacle lenses must be figured with infinitely greater precision. Many of the lenses used in refractive instruments are

The Ferree-Rand perimeter charts the field of vision. One eye is tested at a time, a mask covering the other. While the patient fixes her vision on a fixation point, the doctor moves a test card along the semicircular frame until it becomes visible to the patient, the point of visibility marking one limit of the visual field.

The slit-lamp, or biomicroscope, enables a surgeon to determine just how deeply a foreign object, like a cinder, lies in the structure of the eye.

ground to an accuracy of a fraction of a wavelength of light—and if men were as wide as a wavelength of light, 3,000,000 of them could stand side by side on the edge of a foot rule.

Astigmatism produces more discomfort than any other refractive shortcomings of the eye. If you are astigmatic, you are unable to see horizontal and vertical lines with equal sharpness at the same time. If the vertical mesh of a screen door is distinct, the horizontal lines are hazy. It used to be thought that the cause of astigmatism was a displacement or tilt of the crystalline lens of the eye. Now it is known that the general cause of astigmatism is a malformation of the cornea.

To measure the cornea curvature, the refractionist uses an instrument called the keratometer or ophthalmometer. It consists essentially of a target which is imaged on the cornea, and a telescope through which the examiner observes the image. The patient looks through an aperture in the center of the target and fixes his vision on an image of his own eye. Light is projected from the target to the patient's cornea; from there the light rays pass through a series of lenses to form a magnified image which the examiner measures. Readings on the dials of the ophthalmometer give the proper figures for the corrective lens needed by the patient.

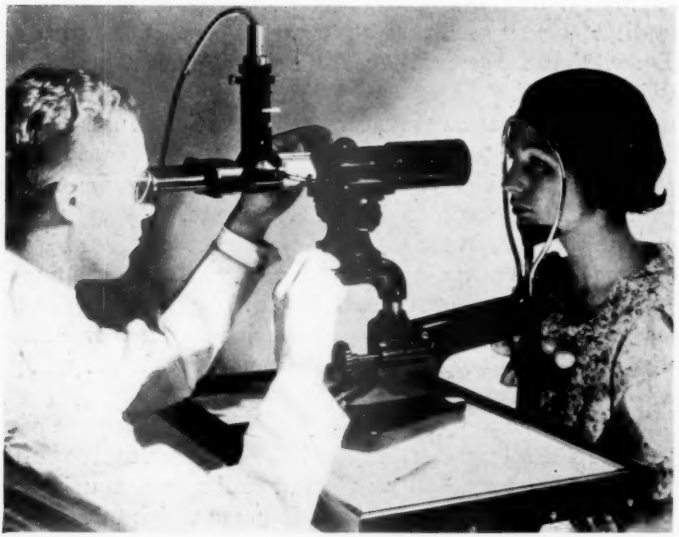
Astigmatism is also measured subjectively by having the patient look at charts until a corrective lens is found which makes both the horizontal and vertical lines on the test card appear equally sharp.

A trial frame, which is a spectacle frame in which test lenses can be placed and removed quickly, is also used in testing astigmatism, as well as nearsightedness and farsightedness. In Green's refractor, mentioned above, trial lenses are not used. The operator obtains lens powers of different combinations by manipulating the proper dials of the instrument, and when he is through he simply reads the correct prescription from the engraved figures which appear in windows alongside the dials.

If an additional check on lens power is desired, the examiner may usher you to a seat alongside his Ferree-Rand projector. This instrument, which is something like a specialized magic lantern, projects the symbols of a test chart on a screen. If you have ever stood in a thick forest at nightfall, you know how darkness creeps up until you are finally unable to see anything at all. The point

where you are just able to distinguish detail, before darkness blots everything out, is your threshold of vision. The eye is most sensitive to changes when working at this threshold.

Taking advantage of this principle, the operator of the projector dims the machine until you can just distinguish the test characters on the screen. Then, with his test lenses, he will strengthen or



An important aid in the diagnosis of brain tumor, kidney disease, anemia and various blood diseases, this instrument, the binocular ophthalmoscope, shows the eye background in stereoscopic depth, magnified 16 times.

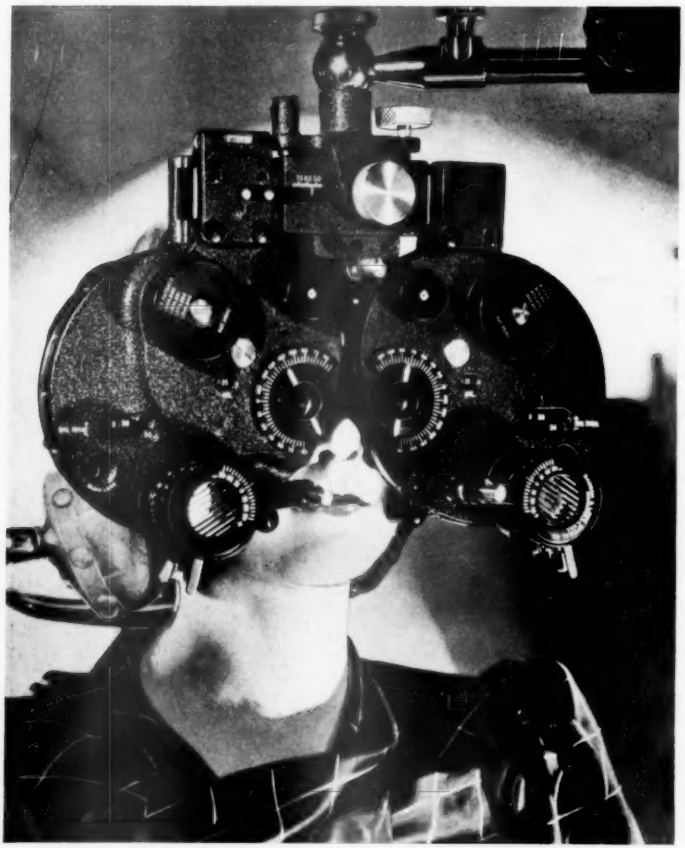
weaken your spectacle prescription very slightly. This tiny change in lens power will either improve your visual acuity considerably, or blur out detail entirely, thus enabling him to choose the proper lens for your eyes with extreme accuracy.

An instrument which the refractionist may use instead of the usual test cards hanging on a wall is the Clason acuity meter. This projects the familiar test symbols on a screen, varying their size rather than the strength of illumination. A sliding lever enables

the operator to enlarge the symbols on the screen from invisibility to any desired size. The patient cannot memorize the symbols and give misleading answers, as sometimes happens when charts are used, for the examiner begins with symbols too small to be distinguished, and stops enlarging them at the exact point where the patient can read them.

By means of the ophthalmoscope, which illuminates the eye by a beam of light, doctors are able to study the interior of the living eye. The condition of the retina of the eye is an index to many types of disease.

The invention of the ophthalmoscope by Helmholtz in 1851 really marked the beginning of the science of physiological optics. Students had always wanted to see into the interior of the living eye, but this was generally believed to be impossible as it was thought that all light shining into the eye was completely absorbed. The ophthalmoscope of Helmholtz proved that when a beam of light is



Green's refractor is a marvelously intricate optical instrument, which is capable of measuring all refractive errors of the human eye. It is one of science's most valuable tools for saving eyesight.

projected into the eye, the deeper parts can be made visible if the examiner looks along the line of the beam.

Essentially, the ophthalmoscope is a hand instrument which generates light from a bulb in the handle and projects it from a mirror into the eye, the examiner peering through a pinhole behind the center of the mirror. To him the pupil then appears red instead of black; what he sees is the retina or background of the eye, with its network of nerves and blood vessels. The eye background is technically called the fundus and it looks like an orange disc, with red blood vessels. The retina is perhaps the most marvelous sense organ of the body. It is the light-sensitive curtain at the back of the eye which transmits images formed upon it to the brain via the optic nerve. Thinner than a sheet of onionskin, microphotographs reveal that the retina consists of ten layers. The deepest layer is made up of rods and cones (so named from their appearance) which in some mysterious way seem responsible for the chemistry of vision. In each eye there are some 130,000,000 rods and cones—one for each man, woman, and child in the United States.

Actually the retina is an extension of brain tissue. It is, in fact, the only spot in the body where the living brain may be observed. This fact makes it of vital importance in diagnosing many other diseases than those of the eye. A brain tumor, for instance, often betrays its presence through the condition of veins and arteries of the retina. Kidney disease, anemia, certain stages of diabetes and many other diseases leave important symptoms in the retina. Such is the vital organ whose examination the ophthalmoscope made possible.

In the past two decades the binocular ophthalmoscope has partially replaced the older hand type. The retina area can be observed in three dimensions by the binocular instrument, which does not differ in fundamental principle. Instead of a flat view of the fundus, the binocular instrument obtains a picture with depth, magnified some 16 times, enabling the topography of the retina to be studied.

Similar in appearance to the hand ophthalmoscope is the retinoscope, a device which enables refractive lenses to be prescribed without the co-operation of the patient. It is often used in prescribing lenses for children or for illiterates who cannot read the alphabet

on test cards. Babies as young as ten months have been fitted accurately with glasses—so accurately that the infants cry for them if mother neglects to put them on.

Optical principles on which the retinoscope is based are extremely complicated, but in practice the examiner determines the strength of corrective lens which is needed by throwing a narrow beam of light into the eye from the retinoscope and observing the direction of movement of the light spot and its accompanying shadows as the light beam is moved across the eye.

Your eye has several fields of vision, one for each primary color. Certain nerves are sensitive to blue, red, and green light respectively. Out of these three primaries all sensations of color are derived. All three primaries in combination give white; their total absence, black; and yellow and purple and other hues are merely combinations of the primaries in varying proportions. This fact is the basis of all systems of color photography.

"Visual fields" do not refer to depth of vision, or acuity, but to absolute area. If your eye is average, the widest color field is for blue, then red, with green the smallest. In certain eye diseases, such as glaucoma, the visual fields are important guides to diagnosis. One instrument for measuring these fields is the Ferree-Rand perimeter. The patient sits with his face on a chin rest, one eye masked, and focuses on a fixation point while the examiner moves a test object along a semi-circular frame. The point at which the object can be distinguished as to color marks one boundary of the visual field for that hue.

Another instrument serving a similar purpose is the Stereo-Campimeter. In this device the patient looks through binocular lenses at a stage, upon which test objects are manipulated to chart the fields. By the substitution of twin photographs, exactly like those used in the old parlor stereoscope, patients with squints or improperly co-operating eye muscles are aided to overcome their trouble. This is called fusion training. In squints, one eye usually does most of the work. The binocular design of the Stereo-Campimeter forces both eyes to work together and muscles are trained to proper functioning.

One of the most extraordinary instruments used by eye physicians is the slit-lamp. In effect, this marvelous machine uses a thin

beam of light to slice out a section of the eye and place it upon a microscope slide for thorough examination, just as a surgeon would perform the operation with a knife. Actually it is purely an optical phenomenon.

If a cinder becomes imbedded in your eye, or if you have a beginning cataract in the crystalline lens of your eye, the slit-lamp enables the physician to determine the exact depth at which the lesion exists. The instrument consists of a powerful light source which throws a narrow beam of light to the desired layer of the eye, and this is examined from an oblique angle with a binocular microscope. With magnifications up to 50 times, the cornea, as an example, appears stereoscopically to have a depth of approximately half an inch and the depth of objects or natural structures can easily be determined.

1937 Survey of Fireworks Accidents in Maryland*

THE number of personal injuries caused by fireworks during the period of a week before and a week after July 4, 1937, in Maryland was 154 per cent greater than the number reported for the same period in 1935. To remedy this situation the Maryland Society for the Prevention of Blindness recommends adequate legislation and safety education

Object

The object of the survey was to secure accurate and complete statistical information with respect to personal injuries caused by the promiscuous sale and use of fireworks in Maryland during the period of a week before and a week after the Fourth of July, 1937.

Method

The survey was the most accurate and comprehensive of its kind ever conducted in Maryland, and was made possible by the cooperation of the state and city health departments, the state and city police departments, the city fire department and of every hospital and physician, and of many newspapers in the state. Well in advance of the Fourth, accident report forms prepared by the Maryland Society were distributed by the Society to 799 physicians outside Baltimore, to the county health agents of 23 counties and to the 43 hospitals in the state. Through the Baltimore Police Department and the state police department such report forms were distributed to the city police and to each of the state police substations. Through the Baltimore City Health Department, such accident report forms were distributed by the commissioner

* Report submitted by Francis F. Symington, Chairman, Fireworks Accident Committee, Maryland Society for the Prevention of Blindness.

of health to each of the 1,200 physicians in Baltimore. All were urged to report every accident caused by the use of fireworks which came to their attention during the week before and the week after the Fourth. The Maryland Society also clipped newspaper reports of fireworks accidents in the state for the same period.

Statistics

It appears from the reports received that there were 295 persons who suffered personal injuries of sufficient seriousness to require medical attention as a result of fireworks accidents in Maryland during the period indicated. One child was killed in Baltimore City. Of the total number of cases in the state, 207 occurred in Baltimore City, and 88 in the state outside of Baltimore City.

Age.—Various breakdowns and classifications of the statistics with respect to the total number of cases follow:

Age	*City*	*County*	*Total*
Under 1 year	1	0	1
One year to 5	5	5	10
6 to 10	54	26	80
11 to 15	101	25	126
16 to 20	19	9	28
21 to 30	18	7	25
31 to 40	3	7	10
41 to 50	1	4	5
51 to 60	2	0	2
Age not reported	3	5	8

217 persons injured were under 15 years of age.
78 persons injured were over 15 years of age.

Color.—Of the 295 injured, 283 persons were white and 12 were colored.

Sex.—There were 249 males and 46 females injured.

Types of Fireworks Causing Injury.—The types of fireworks are enumerated below:

Type of Fireworks	*City*	*County*	*Total*
Sky-rockets	2	5	7
Roman candles	2	6	8
Sparklers	2	1	3
Torpedoes	4	6	10
Ordinary firecrackers	180	67	247
Miscellaneous types	17	3	20

Parts of Body Injured.—Of the total number, 38 persons suffered face injuries; 8 had neck injuries; 20 suffered injuries to eyes; 181, to hands or arms; 25, to feet or legs; and 23 persons suffered injuries to other parts of body.

Particular Use of Fireworks.—Firecrackers exploding in bottles caused injuries to 5 persons; and 11 persons were hurt by firecrackers exploding in tin cans.

Outstanding Accidents

The following are a few examples of the types of accidents (identification purposely not disclosed):

Child—age 8.—Baltimore City. While lighting a sparkler in the rear yard, dress caught fire from the match. First and second degree burns on body and arms. Taken to Baltimore City Hospital, where she died at 4 A.M., July 5, 1937.

Young man—age 24.—Baltimore City. Sky-rocket exploded in hand. First and second degree burns of back of four fingers of right hand. Taken to Baltimore City Hospital.

Child—age 10.—Baltimore City. Tin can placed over large firecracker by 12-year-old boy. Struck child 45 feet from place where it was set off. Lacerated mouth. Twenty-five stitches required. Treated at West Baltimore General Hospital.

Young woman—age 20.—Baltimore City. Struck over left eyebrow by tin can hurled by an exploding firecracker. Irregular laceration two inches long over left eyebrow. Treated at Baltimore City Hospital.

Child—age 12.—Baltimore County. Placed a firecracker in small bottle. Bottle broke into small pieces and struck him in eye. Sent to Johns Hopkins Hospital, where they operated on his eye.

Child—age 12.—Baltimore County. Injury to forehead and eye from firecracker exploding in tin can. Deep laceration above eye. Treated by physician.

Child—age 13.—Caroline County. Placed a three-inch firecracker under tin can. Throat cut by flying tin. Required 27 stitches. Hospital.

Young man—age 23.—Cecil County. Riding in automobile when he took firecracker from pocket and lighted it by mistake for cigarette. Abrasion of upper and lower lip. Hospital.

Child—age 9.—Charles County. Explosion of Roman candle. Burn of cheek and contusion of upper left eyelid. Treated by physician.

Child—age 8.—Frederick County. Second degree burn of face and left hand. Eyebrows and lashes singed off. Corneas milky. Treated by physician.

Child—age 10.—Montgomery County. Firecracker exploded in hand. Laceration of cornea of left eye with hemorrhage into anterior chamber. Hospital.

Young woman—age 29.—Washington County. Torpedo exploded and part went into left eye. Burn of left eye and hemorrhage in vitreous cavity. Washington County Hospital.

Conclusion

The survey supports contentions which have long been made by the National Safety Council, the American Museum of Safety, the National Society for the Prevention of Blindness, the Maryland Society for the Prevention of Blindness, and all those who have made any study of fireworks accidents, namely, that *all fireworks are dangerous*, because the promiscuous use of them involves the indiscreet use of *two dangerous elements: fire* and *powder*. Furthermore, the survey supports the contention of the Maryland Society that fireworks do far more harm in Maryland than is realized by citizens and public authorities, particularly those responsible for the safety and physical well-being of the children of this state. It supports the contention of the Maryland Society that there should be a state-wide law in Maryland, as there is in many other states, which, while permitting displays conducted by properly qualified public authorities and private organizations, prohibits the promiscuous sale and use of fireworks.

In 1935 a bill to remedy this situation was introduced in the general assembly and was actively sponsored by the Maryland Society with the co-operation of numerous other public authorities and private organizations which were awake to the need for such an act. The bill was killed. At that time representatives of the Maryland Society warned the legislators and the public authorities that without some such legislation there would be an alarming increase in the inexcusable personal injuries, particularly to children,

resulting from the widespread sale and use of fireworks in Maryland. In order to back up this warning, the Society thereupon determined to get at the facts.

In 1935 it conducted a survey of fireworks accidents in the state outside of Baltimore during the period of a week before and a week after the Fourth. From this survey it appeared that during that period over 100 persons sustained personal injuries and 3 persons were killed. (These figures do not include 3 other persons killed and 22 other persons injured during the month of June, 1935, as a result of explosions in fireworks factories in Harford County.) According to the records of the Baltimore Safety Council, 16 persons were injured in Baltimore City during the same period.

Because of lack of funds the Society was unable to conduct a survey in 1936. From a compilation of various unorganized reports, however, it appeared that the total number of persons injured in the state outside of Baltimore for that year remained about the same and that there was a 100 per cent increase in Baltimore City.

The 1937 survey covered the entire state and indicated that one child was killed and a total of 295 persons sustained personal injuries in the state during the two-week period before and after July 4, 1937—88 of these casualties occurred in the counties and 207 in Baltimore City.

It appears, therefore, that since 1935, when the state-wide bill prepared and sponsored by the Maryland Society was defeated, there has been an alarming increase in the total number of persons injured by fireworks in Maryland. The total for 1937 was 154 per cent greater than that reported in 1935. During the same period there has been an even more alarming increase in the number of persons so injured in Baltimore City, the number in 1937 being over ten times as great as the number reported in 1935. In short, the facts have shown that the Maryland Society was tragically right in the warning which it gave in 1935.

Will state-wide legislation help this situation? The Maryland Society is convinced that it will and that it is the only thing that will. It has helped in other states. A most striking example is to be found in the State of New Jersey, which, in 1936, passed an act somewhat similar to the one defeated in the Maryland Legislature in 1935. Through this legislative action, New Jersey reduced

the number of Fourth of July fireworks accidents from 927 in 1936 to 72 in 1937—a 92 per cent reduction.

The Maryland Society realizes that adequate legislation alone is not enough. There must be education, for in the long run no law can be more effective than the sanction behind it. On the other hand, no public opinion however educated and no sanction however strong can operate effectively without some sound means of control. Therein lies the need for proper legislation.

New Trends in Sight-Saving Class Activities

Winifred Hathaway

THE philosophy underlying sight-saving class teaching has made much progress since the early years of special education. Through study of the physiology and pathology of the eye; through intelligent use of illumination and auditory aids; and through an understanding of vocational possibilities, the modern sight-saving class teacher is able to train her pupils to play a useful rôle in the world's work

REAL progress is usually a growth rather than a sudden development. It took a very long time for elementary school education to progress beyond the idea that the three R's constituted a school program. Not, indeed, until the system was well advanced did the educational authorities decide to let down the bars to give cultural subjects a place in the curriculum.

Time was when it was looked upon as a misdemeanor for a child to talk in school, and not long ago the activity program was not admitted to be a possibility. Special education was such a latecomer into the educational field that it is small wonder that in its early years it should have been bounded by the same concept of limitations.

Early Limitations in Sight-Saving Class Work

In the early years of special education, particularly in sight-saving classes, the lack of precedent made the trial and error method the only one possible. At that time educators knew and, indeed, were expected to know, very little about the process of seeing. Procedures were dominated by the fear that something might be done educationally that would further harm already damaged eyes. Mute witness was the insignia over the doorway of the first myope

school opened in London, "Reading and Writing Shall Not Enter Here."

For a considerable part of the time covering the history of sight-saving classes, the emphasis was definitely placed on limitations and prohibitions rather than upon expansions of opportunities. Psychological reactions caused by inhibitions were given less attention than the possibility of actual harm to the eyes. Efforts were centered more on defending and protecting the weakness of the individual than upon developing his strength.

The White House Conference Report of 1930 called very definite attention to this discrepancy in all lines of special education, and gradually a new attitude has come into being—that of emphasizing possibilities and of opening up broader fields of opportunity. Naturally, in the new trends, the fact that the handicapping disabilities must be given all necessary care is never lost sight of.

Medical and Optical Advances

But emphasis is now being placed on expansion. In order to make this possible, the modern sight-saving class teacher has the very definite objective of keeping abreast of advances in medical science and in education. Both are a constant challenge.

Detachment of the Retina.—Even as late as ten years ago, a detached retina was thought to have but one result—blindness. Today, the sight of innumerable eyes is being saved by a new diathermic procedure of operation. The important point is that the earlier the discovery is made and the treatment instituted, the greater is the hope of accomplishing the desired results. Every sight-saving class teacher knows that although detachment of the retina may be the result of any one of a number of causes, it is more frequently associated with high myopia than with any other single defect; hence she gives special attention to the activities of the high, progressive myope.

But something more than this is necessary. Is the sight-saving class teacher on the lookout for any sudden diminution of vision in myopes or in others? Does she act as a source of information in the community to spread the knowledge that any sudden diminution of vision requires immediate attention? Surely the sight-saving class teacher who has kept abreast of scientific medical advances must

assume the responsibility of becoming a teacher in a much wider sense than that of teaching the group immediately under her care. First, she must learn, and then she must reach out into the community with this new knowledge.

Corneal Transplantation.—Again, although much research work has, in the past, been done on the possibility of transplanting corneas, only very recently have techniques been developed for transferring the clear cornea of a human eye to replace the scarred cornea of another. Clear corneas are being obtained from eyes that are otherwise useless and have to be enucleated as a result of accident, brain tumor or other cause. It has been discovered that the cornea from the eye of a fetus may, in some cases, be used. The sight-saving class teacher must be most conservative in making a statement regarding this new development, but every teacher should have in mind the possibility of such operation in those cases of corneal scars in which the rest of the eye functions. How marvelous if some of these low-visioned children at present in sight-saving classes could actually, like the story of the Arabian Nights, have new lamps substituted for old!

Gonorrheal and Syphilitic Eye Involvements.—There is another advance in medical science that may be more far-reaching. Researches indicate promising possibilities for curing gonorrhea, a cause of much blindness and impairment of vision. A short time ago, Dr. Thomas Parran, now Surgeon General of the United States, was not permitted to broadcast a talk on syphilis. The word was tabooed by radio and by the press. Medical journals were presenting articles on this subject, but how could such articles, even had they been written in non-technical language, reach the layman? Dr. Parran, realizing that most harmful germs thrive in the dark, answered that the only way to overcome this germ that was so disastrously affecting humanity, was to bring it out into the light, and he thought the radio was the most effective method.

But when he was cut off so summarily, another way opened. *Reader's Digest* published the article. Reprints were made available and were distributed far and wide by health and educational authorities and by civic organizations. The response to this article was a demand for a second, and hearing the voice of the public, the radio authorities rescinded their ultimatum.

The general subject is being widely discussed and emphasis is now being placed on prenatal care, for it is during the prenatal period that the germ works most insidiously. If all forces work together to stamp out syphilis, it is not impossible that there will no longer be found in sight-saving classes or in clinics children with interstitial keratitis, optic atrophy, iritis, cyclitis and various other eye difficulties that so often are the result of this disease.

Contact Lenses.—Along other lines of scientific advance with which the sight-saving class teacher must be familiar is the contact lens. Although this type of lens has been known for some time, only rather recently has it been made of practical use. Contact lenses are of particular value in cases of conical cornea and in some cases of myopia. The ophthalmologist is, naturally, the one to decide whether they will be of value in particular instances, but unless information is given as to the existence of such possibility, the ophthalmologist may wait in vain to be of assistance.

Telescopic Lenses.—Telescopic lenses have a similar history and here, again, it is the function of the sight-saving class teacher to act as a medium of information between the layman and the physician.

Advances in Lighting

Educational trends are no less worthy of consideration. All along the line there is a broadening of concepts. Among those that vitally affect people with eye difficulties is the recognition that correct lighting, natural and artificial, is essential for accuracy, ease and speed of seeing. It is now known that the astigmatic eye requires considerably more light than does the normal eye, and that increased illumination of the correct type may act as a compensation so that less human energy is required to bring about desired results in the process of seeing.

Artificial Illumination.—Illumination is being given a very important place in the educational world of today and, as is so often the case, the sight-saving classroom is being used as a demonstration for the rest of the school. It is, therefore, essential that the sight-saving class teacher acquaint herself with the advances along this line. Even when an expert in illumination is called in, the sight-saving class teacher is the authority on the educational side

of the work, and with her knowledge of the eye conditions of her pupils, she should be able to make a check-up on the plans.

A lighting company offered to install artificial illumination in a sight-saving class of a large city as a demonstration. Time and energy were expended and no expense was spared. But in his zeal to have everything as fine as possible, the engineer selected a luminaire with a decorative design in glass around the edges of the totally indirect unit. This, catching the light, made a distressing halo around each unit and the school system refused to have further installations made.

Uses and Abuses of Photoelectric Cell Control.—One of the scientific advances in illumination with which the sight-saving class teacher should be familiar is the photoelectric cell control. But she should know much more than just the fact that such a method of control exists. In one place where a photoelectric cell was installed, the sky is often obscured for brief moments by passing clouds: this caused a most distressing flashing on and off of the artificial illumination. In another classroom, the photoelectric cell would not work properly unless the upper part of the windows was painted. Every student of illumination knows that the best natural lighting for pupils on the far side of the room comes from the top of the windows. Yet, in order to permit the photoelectric cell to work, that aspect was entirely ignored. How much more desirable to have the natural illumination from the top of the windows and to switch on the artificial illumination when needed, than to install a photoelectric cell requiring this source of natural light to be cut off! As a result of painting the upper part of the windows, the artificial illumination had to be kept on all day, such a needless waste of power and money that the school system refused to consider the relighting of other rooms.

In still another instance, it was thought to be economical to install one photoelectric cell to control all the rooms on different floors of a building that had the same exposure throughout. Other things being equal, rooms on upper floors are likely to have higher intensities than those on lower floors. By this one-control system, when the natural illumination fell below the required minimum on the ground floor, the lights went on in all the corresponding rooms in the building. When it was necessary to draw the shades in some

rooms to shut out the glare or to permit the use of slides, the artificial illumination came on in all rooms similarly situated. Here, again, the expense entailed lessened the possibility of having good artificial illumination in all the schools of the system.

Fortunately, many improvements have been made in the photo-electric cell. The new types prevent the uncomfortable flashing on and off of light; the change is a gradual one. The cost of installation is much lower than formerly.

Although the desire in sight-saving class work has been to do as little intensive eye work as possible for the carrying out of the educational program, the great majority of sight-saving class teachers must confess to "culpa mea." So much emphasis has been placed upon meeting the academic requirements that partially-seeing pupils, as well as those with normal vision, are required to carry altogether too heavy an eye load.

Auditory Aids in Education

One of the present trends in education which is particularly applicable to the sight-saving class pupil is the placing of emphasis more and more on the sense of hearing, and less on the sense of sight. To become a good listener requires concentration, one of the fundamentals upon which education is built. Mechanical devices are doing much to bring this about. Among these, the radio takes first place.

The Radio.—The Damrosch concerts on the radio have opened up for school people a possibility of musical appreciation undreamed of until very recent times. At the time of the California earthquake when so many schools were either wrecked or made uninhabitable, some school work was done by radio, centers being opened in tents for the use of children who had no receiving sets at home. During an epidemic of infantile paralysis in a large city, which necessitated closing the schools, even more was accomplished over the radio than had been possible at the earlier period of the earthquake in California. Neither of these experiments was wholly satisfactory, but each was a step in the right direction.

The vista widens. For the Damrosch concerts the time is arranged far in advance of the actual program, hence school systems adapt their time schedules accordingly. Proposals are now being

made for reserving the use of certain wave lengths exclusively for educational purposes, actual programs of instruction to be prepared with the times arranged sufficiently in advance, as in the Damrosch programs, so that full use may be made of the opportunities offered. This plan will, of course, necessitate co-operative effort but the possibilities are almost unlimited.

The Talking Book.—Another device, although somewhat more limited in scope, is the Talking Book. New appropriations from Congress are making possible large increases in the number of records, and the fact that most of the machines on which these records are used are also radios will make them of double value. In one particular, the Talking Book has an advantage over the radio. If a pupil wishes a part of the reading repeated, or if he was absent at the time the selection was given, the record can be put on again and a pair of earphones used so that he can listen without disturbing the other pupils.

One of the aims of the sight-saving class has been to have the partially-seeing child as much a part of the regular school system as possible, by participating in the regular grade work. The use of the radio and the Talking Book will definitely help solve the problems connected with this co-operative effort. If, for instance, a reading assignment is given to the class in English, all the members can listen to the reading in a group. Surely this is a very great improvement over the present method by which each pupil in the regular grade reads assignments for himself (thus adding to the burden on his eyes), and the sight-saving class pupil returns to his special room, there to have the assignment read to him by the sight-saving class teacher or by a student reader. By the newer method, the energy and attention of the teacher can be released for more creative work. In this way, also, will be overcome some of the difficulties now arising from the paucity of books in large type, and the ideal of the sight-saving class of eliminating unnecessary eye use will be much nearer realization.

Advances in Vocational Guidance

Perhaps the greatest change noticeable in consideration of sight-saving class problems is in the new attitude toward possible employment. It is stated that the invention of a machine deprives

many people of work, but the fact is often lost sight of that new machines create new possibilities of work. The auto, looked at so askance in its early development, has made work possible for countless thousands, not only in the production of the vehicle itself, but in its accessory necessities: gas, oil, etc., all, in turn, requiring the facilities of transportation, service station, salesmanship and an ever-increasing variety of employment.

All these trends have a definite relationship to the question the sight-saving class teacher is asking herself, and which other persons, including her pupils, are asking her. How are partially-seeing pupils to earn a living without further endangering their sight? First, the questions the teacher must ask herself: What are the various types of occupation offered in the community? Which of them can be undertaken by partially-seeing people? How are these people to receive training for such occupations? And most important question of all: What does the pupil, himself, want to do? If he has a special desire and there is no possible way of satisfying this, must not the psychological result that may arise from frustration of his desire be given equal consideration with that of the possibility of increasing his eye difficulty? Is is, perhaps, in this particular, that education of handicapped people has erred most—fearing so much the possible effect on the eyes as to preclude altogether the effect on the personality.

The special class teacher is, of course, greatly concerned about the future opportunities for all her pupils, but there are always those who, even were they unhandicapped, would drift into factory work or other unskilled labor; for such some type of employment can usually be found. It is the future of the pupils with higher I. Q's that forms the problem, and the special class teacher may find a possible solution in some of the newer occupations.

Newer Occupations.—For example, radio has opened up opportunities that may accentuate the strength and minimize the weakness of the handicap. There is on one program a young chap who has outstanding dramatic ability and a fine, resonant, sympathetic voice. He is a hunchback and so deformed that the stage and the silver screen are closed to him. But he delights his radio audience with his fine performances. Others, handicapped as he is, might make most acceptable announcers for radio programs. A girl with

very serious eye difficulty is using her ability to prepare radio and screen continuity programs.

Making the Most of Natural Aptitudes.—Cannot that great gift, a sense of humor, be developed in some of the handicapped so that they may bring to radio audiences the joy and relaxation of laughter? If Will Rogers or Marie Dressler had been totally blind, either could still have given to humanity the merriment that is one of the most potent cosmetics the world will ever have.

It would be interesting to know just how many actors or actresses, either of the stage or the screen, are wearing contact lenses who would, in all probability, have been prevented from using their talents if this advance in science had not made possible for them such mechanical aid.

There are two things necessary in this question of employment: first, to widen the horizon of possibilities by a thorough study of opportunities, of personal fitness, mental and physical; next, to make the junior and senior high schools effective training centers, because the first question asked of any applicant in the present day is, "Are you trained for this job?" It is a big order, for it means training courses along motor, as well as along academic, lines. It means finding out the possibilities for the handicapped, testing their capacities for doing what they desire, and making training available. But it means more than that, since the great majority of girls and boys entering junior and even senior high schools have no definite lead as to future occupations. One solution of this is to extend the work now being very effectively carried out in a few junior and senior high schools. This is a program of pre-vocational training in which opportunity is provided to take preliminary work in a number of occupations in order that the pupil and the instructor, together, may determine a wise course of procedure.

The Minneapolis Plan.—The experiment being carried on in Minneapolis, Minnesota, commends itself for consideration in other places. Briefly, this is a plan of co-operation between the Minneapolis City School Board and the State Department of Vocational Rehabilitation. It grew out of certain findings that pupils with poor vision usually finish high school with little or no vocational training, yet most of them do not go to college. In general, the employer's attitude toward them was found to be decidedly

negative. It was decided, therefore, to give them the opportunity to prove themselves employable by setting up a project of part time work and part time employment for all definitely not going to college, since the best place to begin the vocational rehabilitation is in the school itself.

The experiment began with two girls and three boys. Credit for outside employment was granted by the educational authorities and the rehabilitation department agreed to pay employers for the training at the rate of 50 cents an afternoon, provided the employers paid a like amount to the trainee. A typical program was worked out in which the pupils carried three school subjects from 8:30 to 1:00 o'clock and did actual work under the guidance of selected employers from 2:00 to 5:00 o'clock. The vocational advisement is determined by the public school Child Guidance Clinic and is followed by conferences with the psychiatrist, supervisor of sight-saving classes, student teacher and the supervisors of rehabilitation. The job objective for each is not decided until after a second conference with pupils and parents.

Of the girls, A chose child care and B, routine factory work. Of the boys, A selected greenhouse work; B, retail clothing selling; C, hotel work. Placement was made by the Rehabilitation Department. In general, the plan followed is the same as that which has been found so successful in Antioch College; the pupils may be shifted from one occupation to another until each eventually finds the job he can handle best.

At last hearing, the Minneapolis plan was working satisfactorily. The results will be noted with interest, since the experiment opens up possibilities of solution for one of the most difficult problems concerning the handicapped.

Eternal Vigilance—the Price of Good Eyes*

E. Clifford Place, M.D.

ALTHOUGH encouraging progress has been made in the prevention and control of diseases leading to blindness, much is still to be attained, and the layman, through knowledge of the factors involved in maintaining good vision, is an important agent in the combat against blindness

THE science of medicine, which in the past devoted itself entirely to the cure of disease, has turned more and more of late years to the attempt to prevent disease. This has produced results over a wide field, so that we no longer have the fearful plagues which ravaged the world in previous centuries. Thus smallpox is almost unknown; typhoid fever, which decimated our armies during the Spanish American War, is rare; diphtheria has almost disappeared; and the discovery of insulin has at least gone a long way toward effecting the control of diabetes.

It may seem to you that this has nothing to do with the subject of prevention of blindness, but actually many of the diseases which are now known to be preventable have in the past been responsible for a great deal of blindness. I mention them also to emphasize the fact that the medical profession is constantly engaged in research to find means to prevent as many as possible of the causes of eye affections which now lead to impaired vision.

How many blind people are there in the United States? The answer to this depends upon what is meant by the word "*blind.*" If utter and absolute blindness in both eyes is meant, then the estimate is believed to be about 115,000 in this country. But there is

* Broadcast under the title, "Preventing Blindness," from Station WNYC, May 10, 1938, as part of the Radio Broadcasting Program of the 132nd Annual Meeting of the Medical Society of the State of New York held at the Waldorf-Astoria Hotel in New York City.

a still greater host of people, young and old, who suffer from comparative blindness, varying from those who can perceive motion only, to those who, under the Workmen's Compensation Law in New York State, at least, are considered industrially blind—the eye, in these cases, having 20/200 vision, as represented by the ability to recognize the largest letter on the test chart at a distance of 20 feet.

We believe it is conservative to say that easily one-half of all these unfortunates, whether totally or partially blind, could have been saved from this fate. In some of them, greater medical knowledge of causes of blindness would have helped and, as it is acquired, will help in the future to save others. In many, ignorance and carelessness on the part of the individual himself, or, in the case of children, on the part of the parents, has been responsible.

Congenital and Hereditary Blindness

In order to safeguard your eyes and those of your children, born and unborn, you must know something about the causes of blindness. A good 50 per cent of blindness is congenital and hereditary, and by that I mean that it is caused by an accidental defect in the development of the eye before birth, or by a defect which runs in the family. While it is true that a large percentage of these defects can never be prevented, yet many can be. Whenever I see a person of 70 years of age, or thereabouts, whose appearance and tissues and eyes resemble those of one 10 or 15 years younger, I am likely, upon questioning, to find that his forebears were long-lived and robust on either the maternal or paternal side, or on both sides. And it makes me think, and often say, "How wise it is to choose good ancestors!" But if this be but a pleasantry, its corollary, namely, "How wise for ancestors to choose good offspring," may well have practical value! Thus, if human beings would give some of the thought to the propagation of a healthy race that they give to the breeding of cattle, horses, and dogs, the number of the blind from these congenital and hereditary causes could be diminished. Persons who are blind through heredity should not marry—they will simply bring into the world more children with their own visual defect.

Syphilis

Syphilis, against which the medical profession is now waging a determined war, has taken its toll of eyesight. Children who are born with this disease are subject to a severe inflammation of the eyes, developing a few years after birth, which frequently leaves scars and blindness of varying degree in one or in both eyes. Two bills which were passed at the recent session of the legislature of New York State will be of tremendous help in eradicating congenital syphilis. One of these laws obliges a woman who is expecting a baby to have a Wassermann test of her blood, and the other makes the same test for syphilis compulsory before a marriage license can be issued. Thus the man and woman who plan to marry, and the woman who is pregnant, should find out whether they have this disease, and if they do, they can seek the cure which, with thorough treatment, is quite possible.

Vitamins and the Eyes

That vitamins exert a powerful influence on the eye has long been known. But you will be interested to know that a medical scientist has reported that he is able, at will, to produce cataracts in white rats by feeding them a diet free of vitamin G, while another, at the Texas Agricultural Experiment Station, experimented with pigs. By feeding them a diet containing no vitamin A he was able to produce offspring with no eyes at all. So the diet of the prospective human mother may exert a profound effect on the development of her unborn baby's eyes. Mothers, watch your vitamins! They are most essential for your baby's eye health.

Infectious Diseases of Childhood

Aside from congenital and hereditary defects, the commonest causes of blindness in children are infectious diseases, injuries of various sorts, and tumors of the eye. Measles has taken quite a toll in this list, though parents and physicians now understand the importance of watching the eyes in this disease. Tuberculosis may attack the eye in childhood as well as in adult life. There the preventive measure is the same as in tuberculosis elsewhere in the system—good food, good surroundings, careful hygiene.

Childhood Accidents

The accidents to which children's eyes are exposed are legion, in number and in variety. Weapons of all sorts—"BB" guns, arrows, stones, fireworks and explosives, flying particles, automobile accidents, burns—both with flame and with chemicals—articles used in games and sports, balls, sticks, toys, and a host of others may be mentioned. It is only common sense to say that parents should not leave dangerous articles lying around for normally inquisitive children to handle, and should use judgment in the choice of playthings and games for immature hands to manage. A sad form of blindness is that in which an injury to one eye not only destroys its vision but later, by what is called sympathetic ophthalmia, destroys the other uninjured eye. This occurs in adults as well as in children, but fortunately is not common and can usually be prevented by the early removal of the original eye so blinded.

Posture and Reading

Doubtless you are all interested in the answer to a question which is frequently asked of the eye physician. That question is, "Is it harmful to my eyes, or those of my children, to read in bed?" The answer depends upon three things: whether the illumination is adequate; whether it is correctly placed; and whether the posture is correct. If these three factors are checked, I see no reason why reading in bed is any more harmful than reading in a chair. I believe this question dates back to the days when ceiling chandeliers were the only source of light, and when, in order to see to read at all, a person had to assume an unnatural attitude.

Thus, satisfactory use of the eyes depends upon good posture, that is, with the book or work held at a distance of about fifteen inches from the eyes, good printing, and good illumination. If you find you need brighter light than you used to—if you must go nearer the light to see well to read—it may be a warning that you should consult your eye physician for an examination of the health of your eyes as well as to see if glasses are in order.

Eye Difficulties in Adult Life

Aside from accidents and injuries, the causes which lead to disturbance or loss of vision in adult life are quite different from

childhood dangers. This naturally follows, since adult diseases in general are different from childhood diseases. Thus diabetes, which is rare in childhood, is common in later life; kidney disease and hardening of the arteries belong to the years of maturity. Until we learn more about the prevention of these affections we shall continue to see them and we shall find cases in which they cause disturbances in the eyes. In fact, these diseases commonly attack the eyes, causing spots and hemorrhages in the retina, with resultant visual loss, in many instances even to the extent of actual blindness.

Periodic Health Examinations

This is but another argument for the regular periodic health examination, in order that such diseases may be detected in their early stages, when your physician may help to control them and prevent them from reaching the stage of affecting your eyesight. I believe part of a physical examination in every physician's office should be a test of the vision. A chart hung on the wall at 20 feet will quickly tell whether you have defective vision and your physician can then send you to an eye physician for the detailed examination of your eyes. This should be emphasized in the case of children. Too many parents do nothing about their children's eyes until they get to school, where, finally, the routine examination uncovers a sight defect which should have been discovered a year or two before in the office of the children's specialist. Insist that your physician be equipped to test your vision, and insist that the doctor who takes care of your children find out about the condition of their eyes before they get to school. In this way only can eyes be used in the most efficient way and future eye defects and present eyestrain be prevented.

The Use of Eyeglasses

If your child needs glasses, do not be afraid to put them on him, no matter how young he is. Parents are invariably fearful lest their active child break his glasses in the vigor of his rough and tumble play. It is true that children get their glasses out of order and they break them, but the record shows that serious injuries from such accidents are extremely rare. Instead of fearing glasses and withholding them through pride or for any other reason, be

glad that there are such things as glasses to enable children as well as grown-ups to see correctly and easily. Be sure to have the eye examination made by a medical doctor who makes a specialty of the eye, for only he may use or prescribe the dilating drops which are so essential for an accurate estimation of the trouble, and only he knows and can recognize and treat the diseases of the eye which may be present.

Cataract

But to get back to the adult, I want to mention the two most common causes of blindness—cataract and glaucoma. A cataract is a clouding of the crystalline lens of the eye, which is suspended just back of the pupil. Its formation is gradual, often requiring a number of years to reach the point where vision is seriously affected. Eventually, when the cataract is ripe, as it is called, vision is reduced to the point of recognizing light alone. Formerly it was thought that until this stage of maturity was reached nothing could be done, and, if it happened that a cataract was developing in both eyes at once, the unfortunate individual underwent several years of misery, watching his vision grow dimmer, until finally it was dim enough for the cataract to be operated and sight restored. We now know that this is not necessary, and that a cataract can be successfully removed long before it is ripe. We wait merely until the patient is unable easily to read or work. Although eye drops are frequently used in the hope of delaying the development of a cataract, they are not always successful even in accomplishing this, and once a cataract is well developed an operation is the only cure. No medicine will dissolve it.

Glaucoma

Although one form of glaucoma is violent in its onset and severe in its course, the other form, called simple chronic glaucoma, is very insidious and slow. Its victims are likely some day to find that one eye is nearly blind and the other seriously affected before they realize that anything at all is the matter with their eyes. There is no pain and generally no other symptoms call attention to the eyes. It can be discovered only by unusual alertness on the part of the

patient, or by regular periodic examinations by the eye physician. The common name for glaucoma is "hardening of the eyeball," because as the disease progresses the eyeball becomes firm and tense from the increased pressure of the fluids within it.

The use of eyedrops frequently controls the course of this disease and prevents its further development, but vision lost before its discovery can never be recovered, so the earlier it is found out the better. When medical treatment fails, or loses its grip, operation is often required to control the internal pressure of the eye.

Eyesight—a Personal Responsibility

In any consideration of vision it is important to remember that besides being an optical instrument, the human eye is a living organ, composed of blood vessels, nerves, muscles, and other tissues. All of these parts are subject to the general laws of health. Eye physicians are constantly doing all they can by research and study to learn more about the care of the eyes and the prevention of blindness. For many years the American Board of Ophthalmology, an important board created and perpetuated by eye physicians themselves, has given thorough examinations before permitting candidates to hold themselves out as qualified eye specialists. You, the public, must do your part by consulting the eye physician early—to give him an opportunity to use his knowledge and skill to aid in what every individual must be interested in—the prevention of blindness.

Visibility and Readability of Print on White and Tinted Papers

Matthew Luckiesh, D.Sc., and Frank K. Moss

THE authors note only slight differences in the reflection factors and relative visibility of various tints of paper and conclude that these differences are largely esthetic and do not contribute significantly to ocular comfort

FOR many years certain claims, such as reduction of eyestrain and eye fatigue or increase in eye comfort, have been made for certain tinted papers for clerical and typographical purposes. Notwithstanding these claims and actual promotion and use of certain tinted papers there is no acceptable proof of benefit to human eyes and to human seeing-machines. As is true of all problems of seeing[1] this is a complex one. It involves unobvious or deep-seated psychophysiological effects as well as such relatively obvious factors as eyestrain and fatigue. It involves bodily comfort, mental reactions and even "esthetic comfort" and the fatigues associated with them. Reading is a complex act and the determination of optimum conditions for reading can be achieved only by appraising various attributes of the visual situation and effects of seeing.

The persistence of a state of uncertainty regarding the value of tinted papers may be attributed largely to the practical difficulties of applying appropriate criteria for the appraisal of the more subtle phases of reading, such as the factors of ocular comfort and ease in reading. When these psychophysiological factors are appraised merely by introspective methods, the conclusions thus reached are correspondingly ambiguous and unreliable. It is the purpose of the present investigation to apply several more or less direct behavioristic criteria in determining the visual effectiveness of white and tinted papers as backgrounds for printed matter. In the inter-

pretation of the present data, it is assumed that optimum conditions for critical and prolonged reading are to be determined. Obviously, the visual requirements for casual and occasional reading are far less exacting. The criteria which are primarily appropriate for one objective are not necessarily appropriate for the other.

Criteria

It has been customary to consider visibility and legibility as attributes of printed material. We prefer the term readability rather than legibility since (1) it is descriptive of the act of reading and (2) it is not so likely to be confused with visibility. Obviously, readability is a function of visibility and, in specific cases, the two may be synonymous for empirical reasons. In general, the readability of printed or written material may be defined as that characteristic which determines the speed, accuracy and ease with which it may be read. In other words, it affects the efficiency and efficacy of the reader as a machine and the welfare of the reader as a *human* seeing-machine. It is assumed, for the purposes of this discussion, that the relative merits of white and tinted papers as backgrounds for printing may be determined from measurements of visibility and readability. Obviously, these criteria do not measure directly or even adequately the relative attention-values of various tinted papers or their appearance from an esthetic viewpoint. These factors are involved in the complexity of seeing, but are generally of secondary importance in considerations and measurements of ease of reading. Since the criteria which are used in the present investigation for appraising visibility and readability have been described in detail elsewhere,[1] they are discussed here only briefly.

Relative Visibility.—As the size, brightness or contrast of an object with its background is increased, it follows that the visibility of the object increases. However, quantitative measurements of the relative visibilities of various objects are possible only through the expedient of reducing the visibility of each until the visual threshold is reached. In other words, all visibility measurements are inherently and invariably threshold data. In the present investigation, the threshold conditions were obtained by means of the Luckiesh-Moss visibility meter.[1] This instrument consists

essentially of two colorless photographic filters with precise gradients in density which may be rotated in front of the eyes while looking at an object or performing a visual task. These gradient filters not only reduce the apparent brightness of the visual field due to absorption, but also lower the contrast between the object of regard and its background due to a scattering of light by the photographic film.

A scale value of "1" for this instrument indicates that a simple "black" object upon a "white" background, whose critical detail subtends a visual angle of one minute, is of threshold visibility when viewed under an illumination of 10 foot-candles by a person possessing normal vision, through the corresponding region of the filter. Hence any object which is barely visible through this portion of the gradient filter is assigned a value of unity in visibility. A scale value of "2," for example, indicates that the visibility of the object of regard under the same test conditions is equivalent to that of the standard test object when the latter subtends a visual angle of two minutes. Thus we express visibility in terms of threshold size of object as does the ophthalmologist.

Speed of Reading.—This criterion has been used extensively for appraising the characteristic of readability of printed matter. In such cases it is assumed that the speed with which reading is done or can be done depends upon the ease with which it is read. This is a reasonable assumption in situations involving prolonged periods of reading or extreme differences in the visibility of the printed matter. However, for relatively short periods of reading it does not necessarily follow that the speed of reading will increase when the conditions for reading are improved due to the fact that the effort expended by the reader is not controlled. For example, we have shown[2] that the speed of reading two pages of printed matter was substantially the same under extremely different conditions for reading. In general, it may be assumed that an increase in speed of reading is indicative of more favorable conditions for reading; but that a failure to observe a difference in speed of reading under different conditions does not signify that it is equally easy to read under these conditions. We have shown that speed of performing work is a relatively unsensitive and sometimes misleading criterion of ease or difficulty of seeing. The results of a

recent investigation of the effects of leading upon readability[3] indicated that the apparent influence of this typographical factor did not depend upon the technique of determining the speed of reading. For example, the relationship between the amount of leading and the speed of reading was substantially the same when the subjects read at their natural rates as when they read at their "maximum" rates and were "paced" by continually accelerating the speed of presenting the reading matter. In view of these results, it may be assumed that the measurement of speed of reading by a single technique would be adequate for the purposes of the present investigation. Since other criteria may be applied while the subject reads at his natural rate, this technique was employed.

Ease of Reading.—It is axiomatic that a means for measuring "visual fatigue" would likewise constitute a criterion for appraising ease of reading and by extension—of readability. However, no single appropriate and inclusive criterion of visual fatigue has been established. It is possible to measure certain phases of ocular muscle fatigue. For example, it has been shown[4] that the decrement in amplitude of convergence reserve due to reading for one hour is significantly greater when the reading is done under a low level of illumination than it is under a relatively high level of illumination. From theoretical considerations, this criterion of ocular fatigue is directly applicable in the present research. However, the tediousness of this method and the practical difficulties of applying it to a rather wide variety of cases mitigate its usefulness. We have developed various laboratory techniques[1] with which we have explored the complexity of psychophysiological effects of seeing but these are generally too cumbersome for general application to problems of seeing.

Even though the ocular muscles become fatigued from long periods of reading, it has been shown that they continue to function effectively at the expense of greater effort on the part of the reader. Thus measurements of the ability of the visual mechanism to perform a visual task or test usually do not reveal significant changes in the quality of their performances even after prolonged exertion. Apparently the brain is a hard taskmaster for the organs of vision since clear binocular vision is demanded and obtained under extreme conditions. Hence it should be obvious that the

claims that certain tinted papers are conducive to "ocular comfort" must be supported by other than superficial measurements of visual function and visual abilities.

The acceptance of the conclusion that symptoms of ocular fatigue are seldom revealed from the quality of visual performance suggests the possibility that the effort expended in maintaining a high quality of performance may be reflected in other and less obvious ways. For example, considerations of the meaning and function of the "reflex blink" suggested to us the possibility that this phenomenon might serve as an appropriate criterion for measuring ease of reading. As Ponder and Kennedy stated,[5] "the rate of blinking is closely related to the mental tension of the subject at the time and that the movements (of the eyelids) constitute a kind of relief mechanism whereby nervous energy otherwise unutilized, passes into a highly facilitated path." The results obtained by the authors[1] in using this criterion in other researches indicate that it is one of unusually high sensitivity to physical changes in the stimulus. For example, we have shown that the following changes in the visual situation increase the rate of blinking:

1. An increase in the duration of the period of reading.
2. The use of improper eyeglasses while reading.
3. The addition of a glare-source within the visual field.
4. A decrease in the level of illumination upon the reading matter.
5. A decrease in the size of type read.
6. A decrease in the leading of the type read.

It is obvious that these changes in the visual situation are unfavorable ones from the viewpoints of clear and easy seeing. Hence it may be concluded that the rate of blinking is intimately related to important psychophysiological effects of seeing. As such, it may be assumed that it is an appropriate criterion for the appraisal of the influence upon readability of tint or color of paper used as a background for printed matter.

Typographical Specimens

Since papers are manufactured in almost limitless variations in weight, texture, finish and tint, the selection of a reasonable number of representative samples for appraisal is a highly arbitrary procedure. For the present investigation, ten papers were selected

covering a wide range in tint or color. These papers are commonly used in typographical practice. They were selected without regard to uniformity in surface qualities, and without attempting to obtain a logical sequence from spectral considerations. A description of these papers follows:

Paper	*Reflection-Factor (In Per Cent)*	*Trade Name*
A	85	A & G Special Finish—White (No appreciable tint)
B	70	Blue American Eggshell Text Wove (70 lb.) (Light blue-green tint)
C	82	White North Star Dull Coated (Oxford, 80 lb.) (Slight sepia-cream tint)
D	71	Melon American Eggshell Text Wove (70 lb.) (Reddish buff verging on salmon)
E	81	White Rumford Enamel (Oxford, 80 lb.) (Very slight sepia tint)
F	79	Cochin Yellow D & C Torchon (70 lb.) (Fairly saturated yellow)
G	83	White Oxford Antique Book (60 lb.) (Slight cream tint)
H	74	Green American Eggshell Text Wove (70 lb.) (Light yellowish green tint)
I	82	India Oxford Antique Book (60 lb.) (Deep cream tint or very light buff)
J	38	Cambo Red D & C Torchon (70 lb.) (Fairly saturated yellowish red or reddish orange)

The text matter was printed with black ink in 10-point Linotype Textype with 3 points of leading and a length of line of 21 picas, through the courtesy of the Mergenthaler Linotype Company of Brooklyn, New York. The reading matter consisted of separate chapters from "The Outline of History" by Wells.

Experimental Results

The relative visibilities of the printed matter on the 10 different backgrounds, as determined with our visibility meter under an illumination of 10 footcandles, obtained by indirect lighting from 1000-watt tungsten-filament lamps, are presented in Table I. Each datum represents the arithmetic mean of six series of five measurements each. These series of measurements were taken on different days and the order in which the samples were measured

was reversed on each successive day. It will be noted that the probable errors of these measurements of visibility are of the order of one per cent.

TABLE I

The relative visibility of 10-point Linotype Textype printed upon ten tinted papers, including white and near-white papers:

Subject	*Relative Visibility*									
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
1....	5.04	4.52	5.10	4.76	4.72	4.94	5.29	4.98	5.34	2.80
2....	4.67	4.18	4.64	4.37	4.44	4.65	4.71	4.13	4.70	2.80
3....	2.87	2.73	2.90	2.67	2.78	2.91	2.92	2.82	2.99	1.91
4....	4.69	4.31	4.84	4.61	4.58	4.82	5.16	4.76	5.04	2.87
5....	5.77	5.21	5.62	5.27	5.38	5.87	6.07	5.48	6.10	3.34
Average	4.61	4.19	4.62	4.34	4.38	4.64	4.83	4.43	4.83	2.74
Per cent Probable Error	1.2	1.2	1.3	1.1	1.1	1.1	1.0	1.2	1.2	.9

In the interpretation of the data of Table I it is obvious that the qualities of these papers as surfaces for printing must be considered as well as the spectral characteristics. However, the presence of two variables is more of an advantage than a handicap in this particular problem. It will be noted, from the descriptions of these papers, that three so-called "white" papers (*A*, *C* and *E*) are included in the series. However, in comparison with the tinted papers, the three white ones may be considered to be practically alike from the spectral viewpoint. Since the white papers vary in weight and finish, it is reasonable to assume that differences in the visibility of the same kind of type on each is related to the qualities of these papers as surfaces for printing. Thus differentials in visibility which are assumed to arise from color differences may be compared in magnitude with those probably due to the ink-absorbing qualities of various papers. Although this comparison may be rather qualitative in character, it probably will be a meaningful one to the practical printer. In all cases, the effect of any possible specular reflection was eliminated.

It will be noted that the printing on the white papers *A*, *C* and *E* have visibility ratings of 4.61, 4.62 and 4.38, respectively. Thus

there is a maximum difference in visibility of 0.24, or about 6 per cent, among these so-called white papers. Since this differential in visibility is more than three times as great as the probable error of the difference, the latter may be regarded as statistically significant. Thus it appears that differences in the texture, weight and finish of these papers alter the visibility of the same kind of printing upon these surfaces by about 6 per cent. This is equivalent to a difference in type-size of ½ point as determined by the visibility-meter technique. Thus this datum provides a practical typographical basis for appraising differences in visibility which may be considered to result from differences in the tint of the paper.

If the white paper *A* is selected as a basis for comparison, it will be noted that only two papers, *B* and *J*, give visibility ratings which vary more than 6 per cent (½ point in type size) from the assumed standard *A*. The visibility of black 10-point type on the red paper *J* is 2.74 as compared with a value of 4.61 for the same kind of print upon white paper *A*. In terms of equivalent type-size, 6-point type on the white paper has about the same visibility as 10-point type on the red paper. Obviously, this difference is largely due to the lower contrast due to the lower reflection-factor of the red paper rather than to the ink-absorbing qualities of the paper. From the broader viewpoint of ease of reading the actual color probably plays a part. The relatively low reflection-factor of the red paper not only decreases the brightness of the background of the type but also decreases the contrast between the type and the background. Since paper *B* is bluish in tint, it is not surprising that the visibility of black type on the bluish background is lower than that of paper *A*. In terms of type-size, 9-point type on white paper has about the same visibility as 10-point type on the blue tinted paper *B*. In other words, approximately one point in type-size is sacrificed by using the blue tinted paper.

The visibility of black print on the cream or light buff paper *I* is of particular interest since it is rather widely used. It will be noted from Table I that this paper provides a visibility of 4.83 for the printed matter, or about 4.5 per cent greater than that of the white paper *A* selected as the base of comparison. In view of the differences in visibility which exist among the white papers, it is quite possible that some if not all of this difference in visibility is

due to superior surface characteristics of such paper for the printing of this particular type-face. Of course, even so-called white papers differ in reflection-factor which affects the contrast between the printed matter and the background. Also, the spectral characteristic of a yellow surface is such as to minimize chromatic aberration. It is obvious that this factor is a very minor one in the case of tinted papers of low color saturation. Finally, it will be noted that the visibility of the printed matter on paper *G* is the same as that on paper *I* although the former paper is of a much lighter tint.

Speed of Reading

Four papers were selected for applying the criteria of normal speed of reading and the frequency of the reflex blink, and were selected for the following reasons:

PAPER *A* (white) As an obvious standard of comparison.

I (Deep cream tint or very light buff). Due to the frequent use of this tint in typography.

F (Fairly saturated yellow). Due to the deepness of the tint and high relative visibility.

J (Fairly saturated yellowish red). As a basis of control for the interpretation of the data pertaining to the other papers. This paper is obviously inferior as a background to all of the others and *a priori*, it should be found inferior by all criteria.

In the experimental procedure the subjects were instructed to read at their natural rates and the words read per minute were ascertained. These data are presented in Table II.

TABLE II

The rate of reading was determined by 20 subjects, each of whom read each sample for 5 minutes upon two different occasions. The level of illumination was 5 foot candles in all cases.

	A (*white*)	*I* (*cream*)	*F* (*yellow*)	*J* (*red*)
Words per minute	284	273	266	268
Relative words per minute	100.0	96.2	93.6	94.4
Per cent probable error	..	1.0	1.3	1.4

The results presented in Table II indicate that the speed of reading was greatest with black print upon white paper. However, it will be noted that the maximum difference in speed of reading among these samples is of the order of 5 per cent although the maximum difference in relative visibility (Table I) is about 40 per cent. These results again emphasize the relative insensitiveness of the criterion of speed of reading or, more broadly, of the rate of performing visual work. It will be noted that the black print on the fairly saturated yellow paper was actually read at slightly slower rate than that of black print on white paper notwithstanding the fact that the visibility was about the same in both cases. Apparently actual color, and the reactions of the subjects to color, has some influence upon speed of reading. At the conclusion of these measurements the subjects were asked to state their preference with respect to these papers. They invariably preferred the white and expressed a dislike for the yellow. All emphatically disliked the red paper. Notwithstanding the difference in magnitude of the subjects' reactions to the yellow and red papers, the speed of reading for these two papers was nearly the same. This case illustrates the inadequacy of the criterion of speed of reading and the possibility of erroneously interpreting such data.

It will also be noted that the black print on the cream tinted paper was read at a slower rate than was the black print on the white paper. Thus the apparent superiority of the former, as indicated by visibility measurements, was not reflected in the actual speed of reading.

Frequency of Blinking

The frequency of blinking during the 5-minute periods of reading was observed and the results obtained from the 20 subjects are presented in Table III.

TABLE III

These data represent the average rates of blinking as observed for 20 subjects who read each specimen for 5 minutes on two different days. The order of reading the specimens was reversed on successive days:

	A (*white*)	*I* (*cream*)	*F* (*yellow*)	*J* (*red*)
Number of blinks (during 5 minutes)	29.2	28.8	32.4	34.6
Relative rate of blinking	100.0	98.6	110.9	118.4
Per cent probable error	..	3.2	2.6	3.3

Since it has been shown that the frequency of blinking increases with the difficulty of the visual task, it follows, from the data of Table III, that the readability of black print on white paper *A* is about the same as that of black print on the cream or buff-colored paper *I*. Actually, the rate of blinking was somewhat slower in the case of paper *I* than it was for paper *A*. It is of theoretical interest to note that this slight difference in the frequency of blinking in the two cases is consistent with the difference in the relative visibilities of these samples. However, the observed difference in the frequency of blinking is not large nor is it statistically significant with respect to its corresponding probable error. In general, the cream-tinted paper was found to be slightly superior to white paper by the criteria of relative visibility and frequency of blinking and inferior when appraised by the criterion of speed of reading. In these cases the observed differences possess little statistical significance; and therefore it may be concluded that the cream-tinted paper does not possess unique characteristics from the viewpoint of ease in reading. While this conclusion must be limited to the criteria used and to the results obtained from relatively short periods of reading, it may be pointed out that no significant advantage of the cream-tinted paper was revealed by experimental procedures sensitive enough to detect the influence of such factors as leading, type-size, illumination and deep tints.

It will be noted that the red paper *J* is inferior to all others when appraised by each of the three criteria. On the other hand, the yellow paper *F* provides visibility of the printed matter about equal to the white paper *A*, which has been taken as a standard for comparisons. However, it is decidedly inferior when appraised by the criteria which appear to be appropriate for measuring ease of seeing or some aspect of it at least. Thus it is possible that the dislike for the yellow paper for reading which was experienced by the subjects may originate from physiological as well as psychological causes. We have long contended that a preference for tinted

papers (cream, sepia, etc.) for clerical and typographic purposes may be largely an esthetic matter and that vague feelings of "esthetic comfort" and "esthetic satisfaction" may be erroneously interpreted into eye-comfort.

References

1. THE SCIENCE OF SEEING, by Matthew Luckiesh and Frank K. Moss, D. Van Nostrand Co., New York, 1937.
2. SEEING—A PARTNERSHIP OF LIGHTING AND VISION, by Matthew Luckiesh and Frank K. Moss, Williams and Wilkins Co., Baltimore, 1931.
3. "Effects of Leading upon Readability," Matthew Luckiesh and Frank K. Moss, *Jour. Applied Psych.*, April, 1938.
4. "Fatigue of Convergence Induced by Reading as a Function of Illumination Intensity," Matthew Luckiesh and Frank K. Moss, *Amer. Jour. Ophthal.*, 18, 1935, 319.
5. "On the Act of Blinking," E. Ponder and W. P. Kennedy, *Quart. Jour. Exper. Psych.*, 18, 1927–1928, 89.

Editorials

The Campaign for a "Sane Fourth"

THE National Society for the Prevention of Blindness is undertaking this month a widespread campaign of public education concerning the dangers to eyesight from accidents caused by fireworks. Hundreds of serious eye injuries, some of them resulting in blindness, are the aftermath of the Fourth of July celebration each year. In the belief that Independence Day can be made "safe and sane," the Society and other interested organizations are persisting in their educational efforts—while advocating the enactment of state or federal legislation forbidding the sale of fireworks except for industrial purposes or for use in community celebrations under the direction of an expert on pyrotechnics.

Slight reductions in the number of Fourth of July accidents have been brought about in many of the 500 cities and towns throughout the United States which now have laws prohibiting the sale of fireworks. State or national legislation is needed, however, if we are to find an answer to this problem. Real progress in making the Fourth of July a safe holiday can be achieved only by such wider measures; for nearly every city which has an ordinance is surrounded by good roads leading to suburban towns where fireworks are sold openly and legally.

It is the duty of everyone who values the safety of children to see that laws prohibiting the sale of explosives are widely enacted and strictly enforced. The death or disfigurement of boys and girls, or the loss of sight, as the result of playing with fireworks, is a tragic toll which Americans pay year after year.

The Society's publicity material on the hazards of fireworks is being sent to each of the 2,000 daily newspapers in the United States, and an electrical transcription is being offered to each of the 700 broadcasting stations throughout the country. This record includes an interview with Mr. Lewis H. Carris, managing director, by Mr. Myron Weiss, associate editor of *Time, The Weekly News-*

Some of the students, representing 6 states and the Territory of Hawaii, who participated in the Institute on Eye Health conducted by the National Society for the Prevention of Blindness.

magazine, followed by a brief dramatic sketch of a typical fireworks accident in which a boy is injured. It is the first transcribed radio program produced by the Society.

The Institute on Eye Health

The second institute on eye health conducted by the National Society for the Prevention of Blindness confirms the impression which was created by the first, that there is a distinct field for service in this type of course. The practical nature of the institute is indicated by the fact that the registrants are nurses, physicians, social workers, and teachers, who find it worth while to leave their work for a month in order to take up the study of the special subject of sight conservation so that they may improve their services in their local communities.

Since the first institute was held only a year ago, it is not possible to make definite statements concerning the tangible achievements of the students, but their appreciative letters indicate that they have gone back with renewed enthusiasm to their posts in various parts of the country.

"We were certainly able to get a lot of information in a month. I feel that this was due to the careful planning and preparation of the course," writes one young woman, who is employed as a case reviewer of aid to the blind in West Virginia.

And a school nurse with the Minnesota Department of Health writes: "I considered the information gained at your last institute as very valuable in advising nurses on eye health, especially in their school problems."

A teacher in New Mexico writes: "I will be very busy with my 8,000 children, so I want to take time now to tell you how much I enjoyed and appreciated the privilege of attending the institute. . . . I am so eye conscious that I feel my whole time should be devoted to that particular field."

The sincere enthusiasm and the hope for future achievement which are apparent in each of these letters prove that the institute has taken its place as a potent agency in spreading the knowledge of conservation of vision and prevention of blindness.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

The Doctor and Sight Conservation*

Park Lewis, M.D.

It is often the obvious that we fail to see. What lies directly before our eyes is often lost to us. It is that which is hidden that we have the urge to seek. "Why," says Goethe, "wander so far when the good lies right before us?" When we wish to hide a thing we leave it in plain sight. Hence it may be that the prevention of blindness has, up to the present time, received so little attention, while much time and money are spent on research. The value of research no one questions. It has been the work in the laboratories and its application to clinical medicine that has resulted in the preservation of so many eyes.

It is common knowledge, wherever scientific medicine is practised, that there are more eyes lost through ignorance, carelessness, and indifference on the part of the public than can be saved by the most consummate medical surgery and skill. This is a serious condition that should not exist; that it has existed for ages does not justify our ignoring it. It will continue to exist indefinitely until organized efforts for the control of preventive eye diseases are made by both medicine and society.

There are many reasons for this unfortunate state of affairs. Chief among them is the fact that conditions that lead to loss of sight occur in a large number of cases before they are even seen by one skilled in the handling and treatment of eye diseases. Children are exposed to infections even prior to birth. The ignorance of the public in regard to eyes is stupendous. Even the more intelligent people are not informed

* Appearing jointly, under the title, "Ce Que Sait Tout le Monde," in a forthcoming issue of the *Journal of Social Ophthalmology*, published by the International Association for the Prevention of Blindness, 66 Boulevard Saint-Michel, Paris, France.

as to the dangers with which their children and others are menaced; how much less informed are others, many of whom can scarcely read and know nothing of sanitary, hygienic care.

Up to the present time, protection of human eyes has been left largely to the skilled physician; and what he has already accomplished is indeed worthy of the highest praise. It is due to his researches that the blindness once so prevalent as a result of smallpox has practically disappeared in all civilized countries. Serious results from diphtheria do not occur where toxin antitoxin has been used to develop immunization. If, today, an ophthalmia neonatorum develops in a modern hospital or in a scientific physician's practice, a question immediately arises, as it would in the event of a typhoid fever outbreak, as to where the responsibility lies. The beneficial reduction of the pressure in glaucoma and the development of our knowledge regarding this disease have saved sight in thousands of eyes that would otherwise have been lost. With the increase of industry, safeguards used to protect the workman from bits of flying metal or emery have saved innumerable eyes; and the magnet has been of immeasurable value as an addition to our instrumentaria.

Nevertheless, throughout the world, particularly in the less advanced countries where population is dense and where sanitation is neglected, smallpox still occurs to an unwarrantable degree with a proportionate loss of sight. The Klebs-Löffler bacillus in many communities still works immeasurable damage. Even in our more progressive communities, 7 to 10 per cent of the children entering the schools for the blind have lost their sight from ophthalmia neonatorum. While this great drop from over 25 per cent has occurred in the last quarter of a century, it is still far more than it should be. Accidents are still destroying eyes notwithstanding the protective devices that are employed. One reason for the failure to prevent unnecessary visual loss is that, up to the present time, systematic efforts have not been made in a large way to inform the public how sight is lost and what should be done to preserve it. Ocular sanitation and hygiene are among the last of the subjects on the curricula of our schools, and preventive measures are not yet a part of the system of instruction in our universities. The young mother is supposed by intuition to shield her baby from harm; but unfortunately intuition is not always a reliable teacher. She should have more specific instruction.

The second cause is even more common. The neglect of the application of known preventive measures causes loss of sight in numberless instances. Human nature is altogether too prone to take it for

granted that things will turn out right. Without knowing it, thousands of well-meaning people have fatalistic ideas and they accept as inevitable that which may be wholly controlled or prevented. In this "best of all worlds," in the medical profession, Dr. Pangloss is still contented to treat congenital syphilis instead of preventing it.

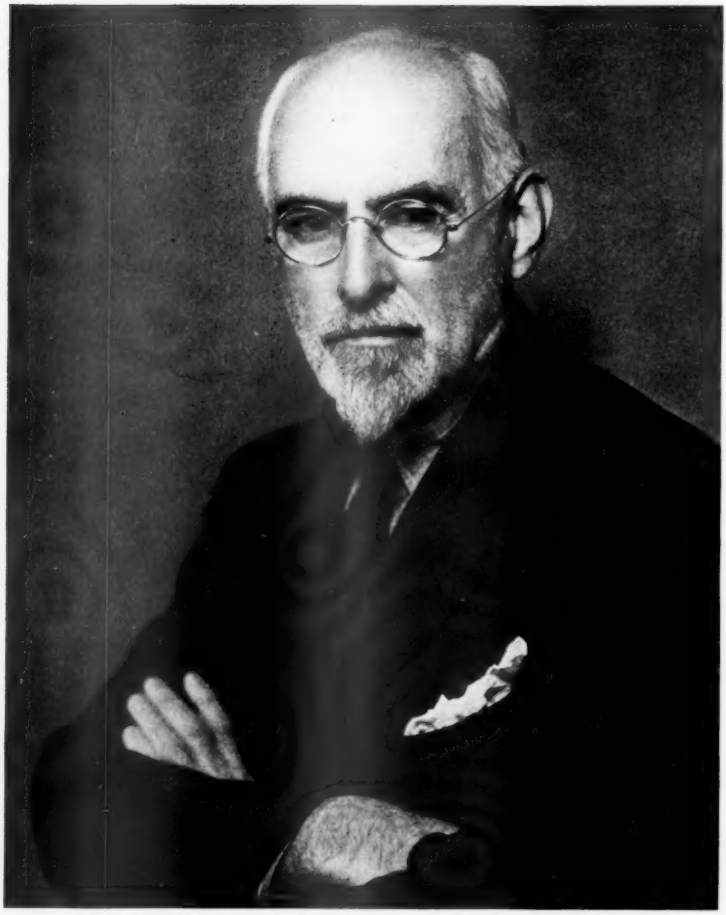
The disasters that come from apathy are even more pathetic than those due to ignorance. The acceptance of the idea that things will come out right, independent of our efforts to make them right, is the fallacy of multitudes who allow dangerous conditions to develop and to continue until they are beyond the possibility of control. This is not only true of acute ocular inflammations: it is far more evident in those subtle, slow forms of eye disease in which there is no outspoken warning. Notably is it the case in chronic simple glaucoma, in which progression is so insidious that irremediable losses occur before help is sought.

A third cause for failure in preventing blindness is indifference—one of the saddest things of the age. This comes from lack of imagination to picture to oneself the loss of so important a function as that of sight. It is deplorable in professional circles when those in whom confidence is placed betray the confidence because of the effort involved to secure measures necessary to save eyes. Conditions are allowed to drift when action should be taken promptly. It is obvious that an obligation rests on both medicine and society to correct a menace so costly both from the humanitarian and from the economic standpoints. Neglect might have been excusable in the past but with improvement in the development of science and in our social relationships, it is imperative that measures should be taken for the betterment of this state of affairs. The general practitioner and—in respect to the eyes—the ophthalmologist occupy a peculiar relationship to the community. They have the confidence of the people; the ophthalmologist in particular knows the avoidable dangers which may affect sight. In the evolution of modern life he has been required to correct and repair damages already done. But it has now become his privilege and is his duty to prevent such damage from occurring. The curricula of the universities have not included lessons in preventive ophthalmology and the ophthalmologist has not felt called upon in many instances to go outside of his special sphere to advance a movement which he might well suppose would diminish his own work. Happily, however, this has not been the case with preventive measures in medicine. When the people learn that early recognition of menacing conditions may prevent more serious disasters and that early help is necessary, they seek such help. It

has been found, where these measures have been instituted, that the work of the physician has been increased rather than diminished thereby. When men and women learn the dangers of syphilis and of gonorrhea and the effectiveness of early treatment, they are keenly anxious to take advantage of this knowledge.

There are three bodies upon whom rests the responsibility of developing a system by which the prevention of blindness may be advanced: the ophthalmologists, to whom the dangers are known; the public, to whom they must be communicated; and the health authorities, by whom preventive measures must be executed. The rigid ethical attitude of the medical profession must be sufficiently relaxed to allow the message to be carried directly to the public. This must be done simply, and, as far as possible, impersonally; but it still must have the weight of authority. The public, on the other hand, needs instruction, which must be given through popular publicity, through lectures, and by every available method to keep lay people informed. To carry the message from the medical profession to the public the department of public health must be an intermediary. Not only must that department instruct people concerning the dangers to sight, but it must make readily available the most effective measures of protection. It is not enough that people be told syphilis leads to blindness: it must be made easily and practically possible for every luetic person, and especially the pregnant woman, to receive the necessary remedial treatment promptly whether they are prepared to pay for it or not. From an economic standpoint it would be less costly for the state to provide such care and to secure suitable treatment for others who had been infected than it would be to care through life for a blind individual or one otherwise physically handicapped by syphilis.

A medium such as the *Journal* of the International Association for the Prevention of Blindness is a necessity. Through it measures should be proposed and it should receive the support of the ablest ophthalmologists everywhere.



Ellice M. Alger, M.D., who, as "A Pioneer in Sight Conservation—Wise, Understanding and Sympathetic Counsellor," is the recipient of the 1938 Leslie Dana Gold Medal.

Note and Comment

Dana Medal Awarded to Dr. Ellice M. Alger.—The Leslie Dana Gold Medal, awarded annually for "outstanding achievements in the prevention of blindness and the conservation of vision," will be presented this year to Dr. Ellice M. Alger, one of the founders of the National Society for the Prevention of Blindness and a member of its Board of Directors. Dr. Alger was selected for this honor by the Association for Research in Ophthalmology in co-operation with the St. Louis Society for the Blind, through which the medal is offered by Mr. Leslie Dana of St. Louis.

The inscription on the 1938 Leslie Dana Gold Medal refers to Dr. Alger as "A Pioneer in Sight Conservation—Wise, Understanding and Sympathetic Counsellor." The conditions of the award set forth that it is to be made for "long, meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight; research and instruction in ophthalmology and allied subjects; social service for the control of eye diseases; and special discoveries in the domain of general science or medicine of exceptional importance in conservation of vision."

Dr. Alger's qualifications for the award may be readily perceived from a review of his career in ophthalmology. His interest in this subject began during his student days at the University of Vermont and has been sustained throughout his professional career. He spent many years in New York City clinics and dispensaries before 1915, at which time he entered his present position as professor of ophthalmology and hospital surgeon at the New York Post-Graduate Medical School, which is affiliated with Columbia University.

Dr. Alger is the author of a book, "Refraction and Motility of the Eye," and has also written numerous articles for various magazines, including THE SIGHT-SAVING REVIEW.

His keen interest in all matters pertaining to the care of the eyes is indicated by his membership, not only in the leading medical and ophthalmological societies, but also in the Illuminating Engineering Society, of which he was director during the days when Steinmetz used to travel from Schenectady to attend each meeting.

The Value of Tinted Lenses.—The glare of the summer sun, particularly at the seashore, always presents the problem of protecting the eyes by the wearing of tinted glasses. Dr. Lyle S. Powell, in a recent article in the *Journal* of the Kansas Medical Society, points out that, despite the varying claims of optical companies concerning the efficiency of their sunglasses, laboratory tests have revealed that differences in the light transmitted by various well-known brands of tinted lenses are not great. He states that, since each person has his own normal light tolerance, the physician should prescribe that lens which makes the patient comfortable and permits him to tolerate his environmental conditions.

"Streamlining" Headlines Increases Legibility.—The present trend in progressive newspapers toward the use of caps and lower case for headlines is approved by Douglas C. McMurtrie, one of America's foremost authorities on modern typography and layout. "There are three to five times as great differences in contours between lower case letters as between capitals," he says. "Therefore, as we recognize letters by differences more than by likeness, lower case type is three to five times more recognizable and readable. So if he has something to tell quickly and effectively, in news or advertising, the smart man will depend on the more legible of those two alphabets."

Since no reader but "a pensioner at the old men's home" has time to wade through a poorly set-up newspaper page, it is important not only that headlines be readily discernible, but that margins between columns be sufficiently wide to avoid giving the impression of gray typography across the paper.

The typeface should be simple in design and sound in letter forms.

British Survey of Causes of Blindness.—A report recently issued by the Prevention of Blindness Committee of the Union of Counties Associations for the Blind, London, contains an analysis of the causes of 5,290 cases of blindness, indicating that the greater number of cases occur after the age of 50. Cataract is responsible for 24.97 per cent of the cases; glaucoma, 11.09 per cent; congenital and developmental defects, 10.96 per cent; and myopia, 10.24 per

cent. Local infection of the coats of the eye accounts for another 5.97 per cent. Congenital syphilis is the underlying cause in 5.12 per cent of the cases and acquired syphilis in another 2.83 per cent. Ophthalmia neonatorum is the cause of 4.91 per cent of the cases. It is heartening to note, however, that only 16.15 per cent of the patients with ophthalmia neonatorum were born after 1914 (the year in which the regulations for ophthalmia neonatorum came into force) and not a single one was born after 1932.

Other causes of blindness include general disease, such as vascular, renal, and cerebral diseases, and diabetes. Industrial accidents and diseases account for only 1.39 per cent.

Facilities of Health Library in Great Demand.—The services of the National Health Council Library, 50 West 50th Street, New York, N. Y., were extended more than 1,500 times during the year 1937 to research workers from all parts of the United States, in addition to staff members of the 17 organizations of the Council, including the National Society for the Prevention of Blindness.

The library now contains more than 6,000 volumes and 30,000 pamphlets dealing with public health, sanitation, hygiene, and related subjects. More than 500 medical and educational periodicals are received regularly from all parts of the world. As an aid to public libraries in the selection of books on health subjects, a list of approximately 300 health books of interest to the general public is being compiled at present.

Polarized Light Banishes Glare.—Polarized light may be applied practically in desk lamps which eliminate glare from papers on the desk; in sunglasses that do away with sunlight reflections on pavements, water, ice, and snow; and in headlights and windshields of automobiles, which cut off the glare from approaching vehicles.

Cross-Eyed American Beauty.—In a vivid description of early American esthetics given by Bishop Diego de Landa in his writings on Yucatan, it is shown that the New World natives of the sixteenth century held it a grace to be cross-eyed. This condition was artificially brought about in infants by the mothers, who suspended

a small plaster from the hair down between the eyebrows and reaching the eyes. This in time caused the child to be permanently cross-eyed.

Maryland Society Surveys Work for 1937.—The Maryland Society for the Prevention of Blindness has recently issued its annual report for the year 1937, presenting a survey of the year's accomplishments in educational activities, clinical assistance, rehabilitation, and legislative activities. The work of the Society has made significant progress and offers much hope for future development.

Transplanting Corneas to Restore Vision.—The transplanting of corneas from corpses to restore sight to the blind has been suggested by Dr. Martin I. Green, an ophthalmologist of San Francisco, who hopes that the humanitarianism of this proposal will result in an amendment of the present law of property in corpses. In order for the operation to be successful, the corneas must be taken from a corpse within 24 hours of death. Hence medical schools may not be used as a source of supply, for they are required to wait for at least a day before disposing of unclaimed cadavers. Then, too, under law, a corpse is the property of the closest relative or friend. Hence the obtaining of written permission to take a dead person's cornea is required.

Heavy Blows Fail to Smash Goggles.—A highly effective device for convincing workmen of the strength of safety goggles is being used by the Gulf Oil Corporation in Port Arthur, Texas. The demonstration consists of lifting a three-pound machinist's hammer by a chain, and letting it drop on a safety goggles lens placed on a block. Since workers going through the gates are allowed to pull the hammer as many times as they desire, the lens has been subjected to heavy punishment during the past three months. Nevertheless, it still remains unshattered.

Electric Shock May Cause Cataract.—The claim that cataract may result from severe electric shock is substantiated by the fact that in the larger electric eels the eyes are almost always affected with cataract.

Hand and Eye Co-ordination.—Studies in ocular dominance reveal that 75 per cent of all human beings are right-eyed and 23 per cent are left-eyed; in only 2 per cent is ocular dominance indifferent or distributed between the two eyes. Practically all right-eyed persons are right-handed, but in the case of left-eyed persons this relation is not as constant, probably because many persons who were originally left-handed have been trained to prefer the right hand. While training, accident, or disease may reverse the manuality of a person, eyedness, i. e., the exclusive use of either the right or the left visual line for sighting, persists tenaciously throughout life. Only severe ocular disease early in life or practical blindness in adults will cause its reversal.

Student Awarded $15,000 for Eye Injury.—A student in a New York City technical high school, seriously injured when hot lead splashed into his eyes, has been awarded $15,000 for the injury. The vocational school was held at fault because it failed to provide goggles for the student.

Lighting Requirements for Healthful Housing.—In a recently published report on the basic principles of healthful housing, the American Public Health Association recommends the provision of adequate artificial illumination and avoidance of glare. At least 6 foot-candles should be provided in all occupied rooms, with at least 10 foot-candles wherever reading, studying, or sewing is done. A minimum of one foot-candle should be provided on stairs and in passageways in order to minimize the danger of accidents. Glare effects should be avoided in the design and location of fixtures. In the kitchen shadows on the sink and work table should be avoided, if necessary by the installation of a second fixture, and in the bathroom the central fixture may be replaced by lighting adjacent to the mirror. Sleeping-rooms should be protected from artificial light sources, such as street lights and electric signs.

Madame Curie Victim of Cataract.—Readers of the recently published biography of Madame Curie, written by her daughter, will be interested in the description of Madame Curie's fight against the threat of blindness from cataract. Several operations were performed and useful sight was finally restored to her.

Bespectacled Cameras.—The miniature camera enthusiast with defective eyesight can now secure a miniature camera equipped to take a correcting lens as part of its range-finder.

Contax cameras, among the leaders in the present miniature field, can be secured with a ring into which the photographer inserts a tiny lens specially prescribed by his oculist. The lens itself cannot be supplied with the camera, because a different one is required by each individual, as is the case with ordinary spectacles.

Fewer Blind Children in London.—There has been a very gratifying reduction in the number of blind children of school age in London. The number in 1914 was 415, or 0.62 per thousand; in 1936 there were 85 such children, or 0.17 per thousand.

College Men Deficient in Vision.—Only one of 50 college students tested for admission to the U. S. Army flying corps is able to pass the physical examination, most of the applicants failing because of defective vision. This is believed to be partly attributable to the poor lighting in many college dormitories.

New Research Center for Prevention of Blindness.—Headquarters of the W. H. Ross Foundation for the Study of Prevention of Blindness were opened in Edinburgh in April. This foundation is the outcome of a generous gift of £40,000 by Mr. William H. Ross, himself a victim of progressive blindness, and is at present the only endowed foundation in Scotland for the purpose of research into the causes of blindness and means of preventing blindness.

New International Sight Conservation Publication.—The first number of the *Journal of Social Ophthalmology*, published by the International Association for the Prevention of Blindness in Paris, appeared in May, 1938. The magazine is now printed in French and English, and, should the need arise, additional languages will be used. The editors plan to maintain close contact with the International Ophthalmological Council, the International League against Trachoma, the International Public Health Office, and the national organizations engaged in prevention of blindness activities.

The *Journal* has made an auspicious beginning and will undoubtedly be of great value in advancing the prevention of blindness movement.

National Society Notes.—Lectures by members of the staff of the Society formed the major part of the morning sessions of the second Institute on Eye Health, March 28 to April 22, which was attended by 19 students who are regularly employed as nurses, social workers, or physicians. The institute was held under the direction of Miss Ruth B. McCoy, director of the Bureau of Prevention of Blindness, New York State Department of Social Welfare, through the courtesy of that agency. Dr. Willis S. Knighton, a surgeon on the staff of the New York Eye and Ear Infirmary, was the director of the medical lectures and arranged for visits to New York City eye clinics. The students were given ample opportunity for discussion and personal conferences.

The Society's keen interest in all legislation pertaining to the venereal diseases is evidenced by the attendance of Mr. Lewis H. Carris, managing director, and Mr. David Resnick, director of publicity, at the sessions of the Senate and House Committees at which the federal anti-venereal disease bill was given a hearing. Mr. Carris submitted for the records a statement concerning the relationship of venereal diseases to blindness and impaired vision.

Forthcoming activities of Mr. Carris will include attendance at the American Medical Association meeting in San Francisco, June 13–17, and at the National Conference of Social Work in Seattle, June 20–28. While in Seattle he will lecture at the summer course for sight-saving class teachers, to be held at the University of Washington; before coming East, he will also lecture at the courses on eye health at the University of California.

The American Medical Association meeting will also be attended by Miss Isobel Janowich, editor, who will be in charge of the Society's exhibit, Miss C. Edith Kerby, statistician, and Miss Anette M. Phelan, Ph.D., associate in health education. Following this meeting, Miss Janowich will be in charge of the Society's exhibit at the National Conference of Social Work in Seattle, which will also be attended by Mr. Carris, Mrs. Eleanor Brown Merrill, associate director, Miss Kerby, and Mr. Resnick. Both Mr. Carris and Mrs.

Merrill will participate in the program of the Conference; Mr. Resnick will handle publicity and Miss Kerby will be available for conferences and consultation, as will the other staff members in attendance.

Mrs. Winifred Hathaway, associate director, has been in Honolulu since the middle of May, making plans for the summer course for sight-saving class teachers which she will conduct at the University of Hawaii from June 27 to August 5. In addition she will participate in the Hawaiian Conference of the New Education Fellowship, which is to be held June 19–25.

The Society is co-operating with the University of California, Berkeley, Calif., in the presentation of two courses to be conducted by Dr. Phelan, beginning June 27. The course on "Eye Health of the School Child" will be open to teachers, nurses, and school administrators; and the course on "Eye Health in Teacher Education" will be open to a limited group of 15 students, to be admitted only with the permission of the instructor.

Miss Eleanor W. Mumford, R.N., associate for nursing activities, attended the Biennial Nursing Convention in Kansas City, Mo., April 25–29, where she took active part in the program and also presented an exhibit of the Society's activities as they relate to the fields of nursing.

As a part of the Society's annual campaign against the dangers of fireworks a radio talk on "Fourth of July Fireworks Accidents" will be given over station WNYC on June 30 by Miss Margaret Schaefer, industrial information secretary.

The Executive Committee of the Society has appointed Dr. Purman Dorman to serve as a member of the Advisory Committee. He succeeds Dr. Harry V. Würdemann, who died on February 2. Dr. Dorman is a practising ophthalmologist at the Virginia Mason Clinic in Seattle and an officer of the State Board of Ophthalmology. He is deeply interested in the prevention of blindness movement and has devoted much time to planning the organization of sight-saving classes in the state of Washington.

Current Articles of Interest

Trachoma in American Samoa, F. Harbert, M.C., U.S.N., *American Journal of Ophthalmology*, April, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The prevalence of trachoma in Samoa is established by clinical and laboratory investigation, which shows that more than 40 per cent of the school children are affected in some degree. Primitive methods of treatment have led to an extremely high percentage of blindness (1,050 cases of bilateral blindness per 100,000 population); but the substitution of appropriate medical treatment, as advocated by the Naval Administration, has reduced bilateral blindness more than one-third in the course of one decade. The widespread use of silver protein, and, lately, of weak zinc-sulphate solution at least helps to reduce the secondary infections which are largely responsible for the complications resulting in blindness.

The Lighting of Industrial Interiors, L. E. Tayler, *Safety Engineering*, April, 1938, published monthly by the Alfred M. Best Company, Inc., Albany. Laboratory experiments have revealed that human efficiency and visual acuity increase with higher levels of illumination and that fatigue curves begin to approach straight lines as conditions for seeing are improved. Given good eyes, the chief enemies of good seeing are glare and inadequate illumination. Good lighting may generally be explained as an even distribution of well-diffused illumination of a specified amount, arrived at as a result of accurate measurement and a study of the task that must be performed.

With the increased knowledge of the advantages of correct light and the advance in illuminating engineering, light sources, and equipment design, there is no reason today to tolerate the hazards of poor seeing conditions in industrial plants. Good illumination goes hand in hand with the reduction of accident hazards, and "light conditioning" industrial areas will permit the human seeing machine to function so that it may do its work efficiently, easily, and safely.

Syphilis and Optic Atrophy, Perk Lee Davis, M.D., *The Pennsylvania Medical Journal,* April, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg. A study of 179 cases of syphilitic atrophy, none of which had received adequate early treatment. Many of the patients had objective signs of syphilis which were not recognized early enough to save sight. From observation of these cases it appears that all patients with syphilitic optic atrophy have one important symptom in common, that is, loss of vision, either partial or complete.

One of the greatest stumbling blocks in the early diagnosis of syphilitic optic atrophy is the infrequency of gross neurologic signs of central nervous system syphilis. A neurologic examination of the most meticulous sort is necessary to pick up the smallest clue which might lead to the diagnosis. In all suspected cases an examination of the blood and the cerebrospinal fluid should be made. This is vitally true because optic atrophy may occur early and, for a long time, be the only sign of locomotor ataxia. It is highly important that patients afflicted with syphilitic optic atrophy receive competent medical treatment.

Ocular Birth Injuries of the Newborn, Harold M. Block, M.D., *Texas State Journal of Medicine,* May, 1938, published monthly by the State Medical Association of Texas, Fort Worth, Texas. Although it may seem that ocular birth injuries are rare, this is true only of the more serious and obvious cases. Some studies have revealed that retinal hemorrhages are present in 50 per cent of infants born through contracted pelves, 40 per cent in premature births, 40 per cent in protracted and difficult labors, 20 per cent in normal babies after normal labor. It has also been shown that 25 per cent of all infants show some ocular disturbance if examined in the first 24 hours after birth. To appreciate this matter properly one must bear in mind the fact that the eyeball of the infant is not as deeply seated in the orbit as is that of the adult, nor is the nose as well developed. The globe is therefore deprived of the protecting margins of these structures, and rendered far more vulnerable to traumatism.

Occasionally conjunctival hemorrhage results from forced instillation of silver nitrate and it is possible that damage may be done

to the deeper structures of the eyes due to hasty, forcible opening of the lids to instill the silver nitrate.

Of great importance is traumatism to the ocular nerves and muscles and many authors mention the possibility of nystagmus resulting from birth injuries.

Sight-Saving: A Co-operative Program, Winifred Hathaway, *Edison Electric Institute Bulletin*, April, 1938, published monthly by the Edison Electric Institute, New York, N. Y. Stressing the importance of co-operation in conserving vision, Mrs. Hathaway points out that the protection and care of the eyes is the responsibility not only of the medical or illumination specialist, but extends even to manufacturers and salesmen of lighting equipment and other materials for classroom or office use. She also gives high credit to the pioneers in science who have performed seeming miracles in preventing diseases that affect the eye: Jenner, who discovered the possibility of making people immune to smallpox, one of the chief causes of blindness and impairment of vision in the centuries before his discovery; Pasteur, who demonstrated the theory of the transmissibility of germs and was thus indirectly responsible for preventing much loss of sight; Koch, the discoverer of the tuberculosis bacillus, who opened the way not only to stamping out the disease itself, but also its effect on the seeing process; Schick, who developed a test for diphtheria, a common cause of blindness; and Credé, who discovered that infection of the eyes of the newborn may be combated by the use of silver nitrate.

Hysterical Blindness in Children, Ernst Wolff, M.D., and George S. Lachman, M.D., *American Journal of Diseases of Children*, April, 1938, published monthly by the American Medical Association, Chicago, Ill. A survey of the literature in the field of hysterical amblyopia, with application to two cases which were successfully treated by an understanding of the emotional factors involved. Both cases were concerned with young girls who were emotionally upset over the loss of a beloved close relative and both of them had witnessed the special interest given to a friend who had trouble with her eyes. The friendly understanding of the doctor led to a prompt recovery in both cases. Although suggestion apparently

played a large part in patterning the symptoms of both children, no direct suggestion was used in treating them. Neither were any of the psychoanalytic techniques employed. Nevertheless, it must be realized that understanding of the functional manifestations described depends on Freud's concept of hysteria as a physical expression of an emotional conflict.

The Treatment of Minor Conditions in the Eye, N. Bishop Harman, F.R.C.S., *British Medical Journal*, April 16, 1938, published weekly by the British Medical Association, London, England. A survey of such common diseases of the eye as contagious and irritant conjunctivitis, ophthalmia neonatorum, and lacrimal obstruction, with suggestions for effective examination and treatment.

Ophthalmo - Oto - Neurology, George W. Mackenzie, M.D., F.A.C.S., *The Medical World*, April, 1938, published monthly by the Medical World, Philadelphia. Treating the subject of nystagmus from the viewpoints of the otologist and the neurologist as well as the ophthalmologist, the author outlines the technique of examination for nystagmic jerking, indicating the symptoms which reveal whether the nystagmus is physiologic or pathologic, and describing in detail the causes underlying this condition.

Book Review

MEDICAL TREATMENT OF CATARACT. A. Edward Davis, M.D., Philadelphia: F. A. Davis Company, 1937. 161 p.

A most concise and well-organized monograph on the medical treatment of cataract has been written by Dr. A. Edward Davis. He believes that senile cataract is a preventable disease, and pleads for a wider recognition of the need for medical prophylaxis and treatment of a disease which is responsible for over one-third of all blindness in persons over 64 years of age.

The material considered and the views held by Davis may be summarized as follows:

(1) Early diagnosis is of paramount importance.

(2) In many cases the presence of other systemic degenerative diseases indicates the necessity for searching for lenticular opacities.

(3) The various etiologies may be local causes, focal infections, arthritis, arteriosclerosis, radiational influences, endocrine, general metabolic and nutritional disturbances. Therefore, it is necessary to consider cataract in connection with every complaint of decreased vision in patients in the older age groups.

(4) Patients should be informed of their trouble early in order to secure their entire co-operation. Inasmuch as senile cataract is frequently an ocular manifestation of systemic or degenerative disease, one must treat the patient as well as the disease.

(5) In Davis' hands lens antigen apparently has proved most beneficial for he states that, by its use, the ordinary senile subcapsular cataract may be arrested in from 75 to 80 per cent of cases when treatment is instituted in the early stage.

(6) Davis believes that lens antigen, by inciting the body cells to the formation of specific antibodies and creating a mild leukocytosis, fortifies the healthy lens fibers against toxins; at the same time the dead lens fibers and cataractous or necrotic material are destroyed or liquefied.

(7) Lens antigen or lens protein should be employed only when the patient's health and habits have been carefully scrutinized. After determining whether the patient is sensitive to intradermal

tests a course of injections should be given. In conjunction, potassium iodide is given by mouth in moderate doses. After the course of injections has been completed instillation of dionin is also employed.

(8) Dietary treatment is stressed, attention being called especially to the beneficial effects of foods containing vitamins. Overeating is responsible for more degenerative diseases than all other causes combined. In regard to proper diet, Davis quotes Barborka, who has stated that all diets must possess the following essential requirements in order to protect and maintain health: adequate protein, mineral elements, vitamins, sufficient calories for energy requirement, and water. In the arthritic and gouty diatheses, alkaline waters have proved of value.

(9) Subjectively, it is usually only late in the course of the development of the lens changes that the patient becomes aware of his visual deficiency.

(10) Another important point which is emphasized in the nonoperative treatment of cataract is the proper correction of errors of refraction.

The case reports should be carefully studied.

In conclusion, Dr. Davis' book presents an excellent discussion of the preventive and medical treatment of cataract. Numerous important factors in the preventive and medical treatment of cataract are discussed and especial consideration is given to lens antigen treatment, which has apparently been of value in the author's experience.

The reviewer believes that we must be ultra-conservative in evaluating the results of any form of treatment and that the efficacy of treatment of cataract requires especial study because of the slow development of lens opacities in the majority of cases.

CONRAD BERENS, M.D.

Briefer Comment

TWENTY-FIVE YEARS OF HEALTH PROGRESS. Louis I. Dublin, Ph.D., and Alfred J. Lotka, D.Sc. New York: Metropolitan Life Insurance Company. 611 p. ill.

This book is invaluable as a reference source to public health workers and others requiring authentic data on mortality. Al-

though it contains nothing directly pertinent to vision, reference is made to diseases and accidents which may indirectly affect the eyes. Charts and maps in abundance present graphic summaries of the trends in the mortality among the industrial policyholders of the Metropolitan Life Insurance Company from 1911 to 1935.

AN INVESTIGATION OF STUDENT STUDY LIGHTING. John O. Kraehenbuehl, Ph.D., Urbana: University of Illinois, 1937. 36 p. ill.

In this study, made in the fraternity, sorority, independent, and dormitory rooms of the University of Illinois, exact data are tabulated for such items as the dimensions and general coloring of the study room and the type, number, and size of lamps used. It was possible to give each item an exact rating on a numerical scale, and in this way to determine the advantage of one lighting system over another. The general conclusion is that the typical study room is poorly lighted, but the condition can be corrected by the intelligent use of lamps, the cost of which is small in comparison with the benefits received. A briefer version on the same study appeared in the March, 1937, issue of THE SIGHT-SAVING REVIEW.

GENERAL HYGIENE AND PREVENTIVE MEDICINE. John Weinzirl, Ph.D., Dr.P.H., and Adolph Weinzirl, M.D., C.P.H. Philadelphia: Lea and Febiger, 1937. 424 p.

Workers in the fields of public health and social service will be particularly interested in this text on the control of disease. The chief subjects considered are immunization, use of specifics, control of environment, and group control. The subjects of eyestrain and illumination are given brief but effective attention.

HEALTH AND HUMAN WELFARE. William E. Burkard, Ph.D., Raymond L. Chambers, Ph.D., and Frederick W. Maroney, M.D. New York: Lyons and Carnahan. 632 p. ill.

The authors of this text-book for secondary school students discuss a wide number of health subjects in a most appealing manner. The book is inspirational in tone, showing the beneficial effects to be derived from proper attention to health. Vision is but one of the many subjects considered, but the discussion, though brief, is valuable, as the eye is considered not only from a physiological point of view, but also in connection with diet, study and working conditions and first aid.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

265. Pioneer Work in Sight Saving, Helen L. Smith. Reprinted from *The Sight-Saving Class Exchange*, June, 1938. 16 p. 10 cts. An account of the first sight-saving class in the United States, which was opened in 1913 with the author as the first teacher.

266. Report of the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America, A. C. Jost, M.D. 8 p. 5 cts. A study of the achievements, actual and potential, of the state and provincial public health authorities in the conservation of vision.

267. Science Saves Eyesight, Donald G. Cooley. 12 p. 10 cts. By means of modern scientific instruments, minute defects in the shape of the eyeball may be measured and the interior of the eye may be examined for the location of foreign bodies or the symptoms of either visual or systemic disease.

268. 1937 Survey of Fireworks Accidents in Maryland. 8 p. 5 cts. As a means of minimizing the number of personal injuries caused by Fourth of July fireworks, the Maryland Society for the Prevention of Blindness recommends adequate legislation and safety education.

269. New Trends in Sight-Saving Class Activities, Winifred Hathaway. 12 p. 10 cts. The philosophy underlying sight-saving class teaching has made much progress since the early years of special education. Through increased knowledge of the aptitudes as well as of the limitations of her pupils, the modern sight-saving class teacher trains them to play a useful rôle in the world's work.

270. Eternal Vigilance—The Price of Good Eyes, E. Clifford Place, M.D. 4 p. 5 cts. The layman, through knowledge of the factors involved in maintaining good vision, may do much to prevent blindness.

271. Visibility and Readability of Print on White and Tinted Papers, Matthew Luckiesh, D.Sc., and Frank K. Moss. 12 p. 10 cts. The authors note only slight differences in the reflection factors and relative visibility of various tints of paper and conclude that these differences are largely esthetic and do not contribute significantly to ocular comfort.

272. The Doctor and Sight Conservation, Park Lewis, M.D. 8 p. 5 cts. The responsibility for prevention of blindness rests on the

ophthalmologist, who is aware of dangers; the layman, who must be informed; and the health authority, who must execute preventive measures.

D118. Eyes and the Office Worker, Arthur J. Bedell. Reprinted from *Hygeia*, March, 1938. 4 p. $1.50 per 100. The essentials of ocular comfort for office workers are proper refraction, preservation of good general health, and efficient illumination.

D119. Report of the Eye Health Committee of the American Student Health Association. Reprinted from the *Proceedings* of the American Student Health Association and the *Journal-Lancet*. 4 p. $1.50 per 100. A study of visual defects of college students.

D120. No One Enters This Plant Without Goggles, Harry Guilbert. Reprinted from *Factory Management and Maintenance*, March, 1938. 4 p. $1.50 per 100. The Pullman Company, by spending $25,000 to reduce eye injuries, has saved $116,000 on compensation expenses, in addition to setting a model record for reduction of eye injuries.

Contributors to This Issue

Dr. A. C. Jost, who is serving as chairman of the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America, is the executive secretary of the Delaware State Board of Health.

Mr. Donald G. Cooley, a well-known writer on scientific subjects, was formerly editor of "Science and Medicine" of the *Literary Digest* and is at present editor of *Your Life Magazine.*

No introduction to REVIEW readers is required for **Mrs. Winifred Hathaway,** associate director of the Society.

Dr. E. Clifford Place is a practising ophthalmologist associated with the staffs of the Brooklyn Eye and Ear and Methodist Episcopal Hospitals and the North County Community Hospital of Glen Cove.

Matthew Luckiesh, D.Sc., and **Frank K. Moss** are the authors of numerous books and articles on the subject of light and sight. They are both associated with the lighting research department of the General Electric Company.

Book reviewer: **Dr. Conrad Berens** is a member of the Society's Board of Directors.